SGI 225
SGI 250
SGI 266
SGI 300
SGI 500

INSTALLATION AND OPERATION MANUAL

Revision D

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IMPORTANT REGISTRATION AND WARRANTY INFORMATION

For warranty to become active, this inverter must be registered. To activate warranty and register inverter, please visit the link below.

www.solren.com/registration

IMPORTANT SAFETY INSTRUCTIONS

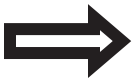
In this manual “inverter” or “inverters” refers to the inverter models: SGI 225, SGI 250, SGI 266, SGI 300 and SGI 500 unless one of the specific models is noted.

This manual contains important instructions that shall be followed during installation and maintenance of the SGI inverter.

To reduce the risk of electrical shock and to ensure the safe installation and operation of the inverter, the following safety symbols are used to indicate dangerous conditions and important safety instructions:

WARNING: This indicates a fact or feature very important for the safety of the user and/or which can cause serious hardware damage if not applied appropriately.

Use extreme caution when performing this task.



NOTE: This indicates a feature that is important either for optimal and efficient use or optimal system operation.

EXAMPLE: This indicates an example.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

- All electrical installations shall be performed in accordance with the local, American and Canadian electrical codes.
- The inverter contains no user serviceable parts. Please contact Solectria Renewables or a Solectria Renewables authorized system installer for maintenance. See Appendix C for Solectria Renewables contact information and authorized system installers.
- Before installing or using the inverter, please read all instructions and caution markings in this manual and on the inverter as well as the PV modules.
- Connection of the inverter to the electric utility grid must be completed after receiving approval from the utility company and must only be performed by qualified personnel.
- Completely cover the surface of all PV arrays with an opaque material before wiring them. PV arrays produce electrical energy when exposed to light and could create a hazardous condition.
- The inverter enclosure and disconnects must be locked (requiring a tool or key for access) for protection against risk of injury to persons. The enclosure includes a lockable handle and comes with a key. Keep the key in a safe location in case access to the cabinet is needed. A replacement key can be purchased from Solectria Renewables.

SAVE THESE INSTRUCTIONS

PRESCRIPTIONS DE SECURITE IMPORTANTES

- Tous les travaux d'installation électrique doivent être exécutés en conformité aux normes électriques locales ainsi qu'à la norme nationale américaine et canadienne.
- Le SGI ne contient aucune pièce requérant un entretient effectué par l'utilisateur. Pour toute maintenance, veuillez consulter Solectria Renewables ou un installateur agrée par Solectria Renewables (les coordonnées de Solectria Renewables et des installateurs agrées sont indiquées sur le site web de Solectria Renewables: www.solren.com.
- Avant d'installer ou d'utiliser le SGI, veuillez lire toutes instructions et toutes les mises en garde présentes dans ce manuel, sur le SGI et sur les modules PV.
- Le raccordement du SGI au réseau électrique ne doit être effectuée qu'après avoir obtenu une entente d'interconnexion auprès de la compagnie locale de distribution électrique et uniquement par du personnel autorisé et qualifié.
- La surface de tous les capteurs PV doivent être recouverte entièrement d'un matériel opaque
- (noir) avant de procéder au câblage. Les capteurs PV exposés a la lumière produisent du courant électrique susceptible de créer une situation de risque.

CONSERVEZ CES INSTRUCTIONS

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1.0 Introduction

The Smart Grid inverters (SGI) are commercial, three-phase grid-tied PV inverters designed to be interconnected to the electric utility grid. By following this manual the inverter can be installed and operated safely. This installation guide is used as a reference for the commissioning process and as a guideline on how to use the inverter most effectively.

Feeding power into the grid involves conversion of the DC voltage from the PV array to grid compatible AC voltage by inverting DC to AC. This unit feeds power into a standard, three-phase commercial, industrial, institutional or electrical utility facility's electrical system which is connected to the electrical grid.

If the PV system and inverter are providing the same amount of electrical power that the facility is using, then no power is taken from or fed into the utility grid. If the facility is using more power than the PV system is providing, then the utility grid provides the balance of power. If the facility is using less power than the PV system is generating, then the excess is fed into the utility grid.

Be sure to follow local regulations regarding net metering and interconnection in your local area. Note that some utilities need to change their revenue kWh meter for proper net metering measurement and billing.

Figure 1.1 – Grid-Tied Inverter Application

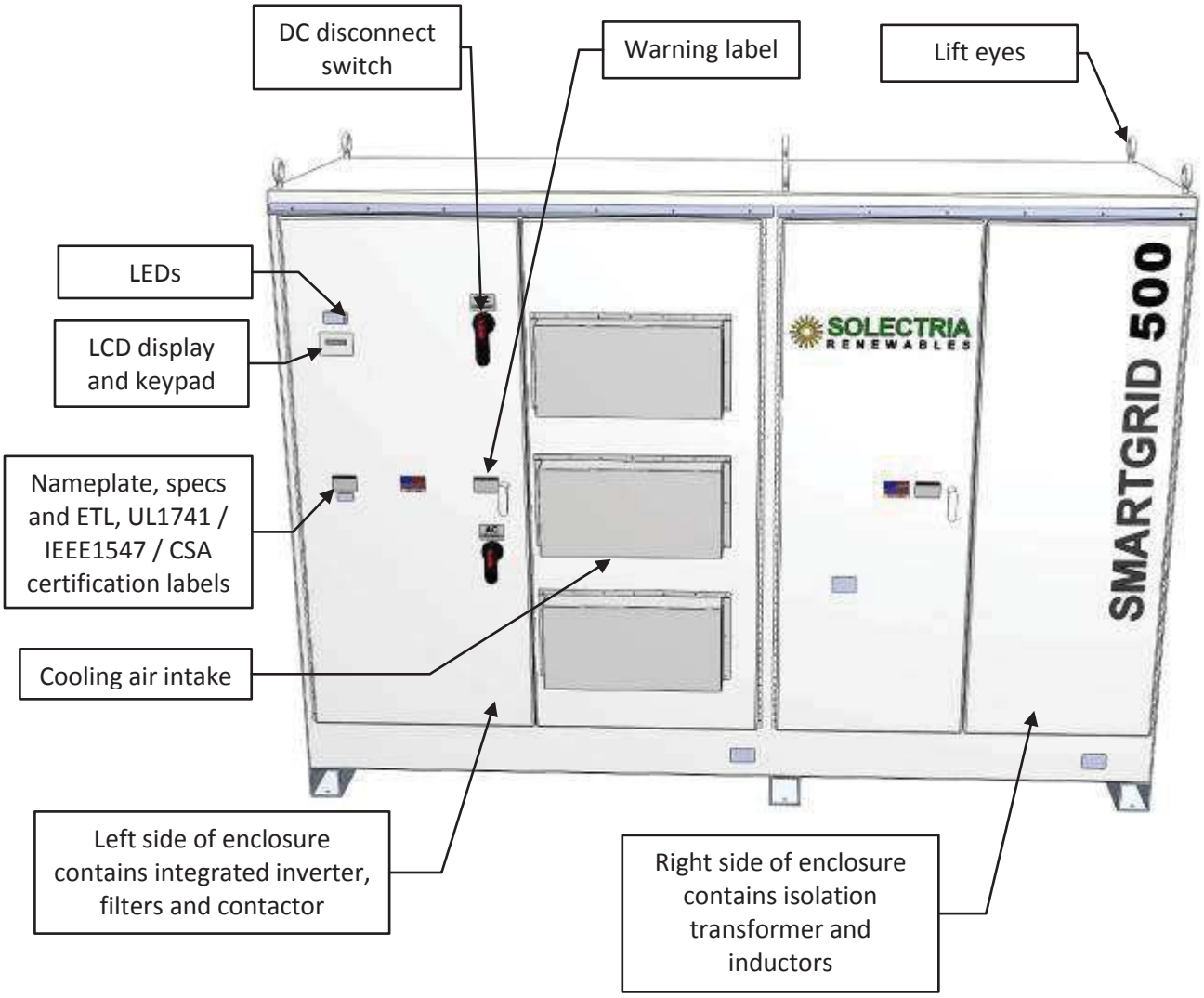

DC disconnect switch
Warning label
Lift eyes
LEDs
LCD display and keypad
Nameplate, specs and ETL, UL1741 / IEEE1547 / CSA certification labels
Cooling air intake
Left side of enclosure contains integrated inverter, filters and contactor
Right side of enclosure contains isolation transformer and inductors
SOLECTRIA RENEWABLES
SMARTGRID 500

Figure 1.2 – The SGI Inverter (Front)

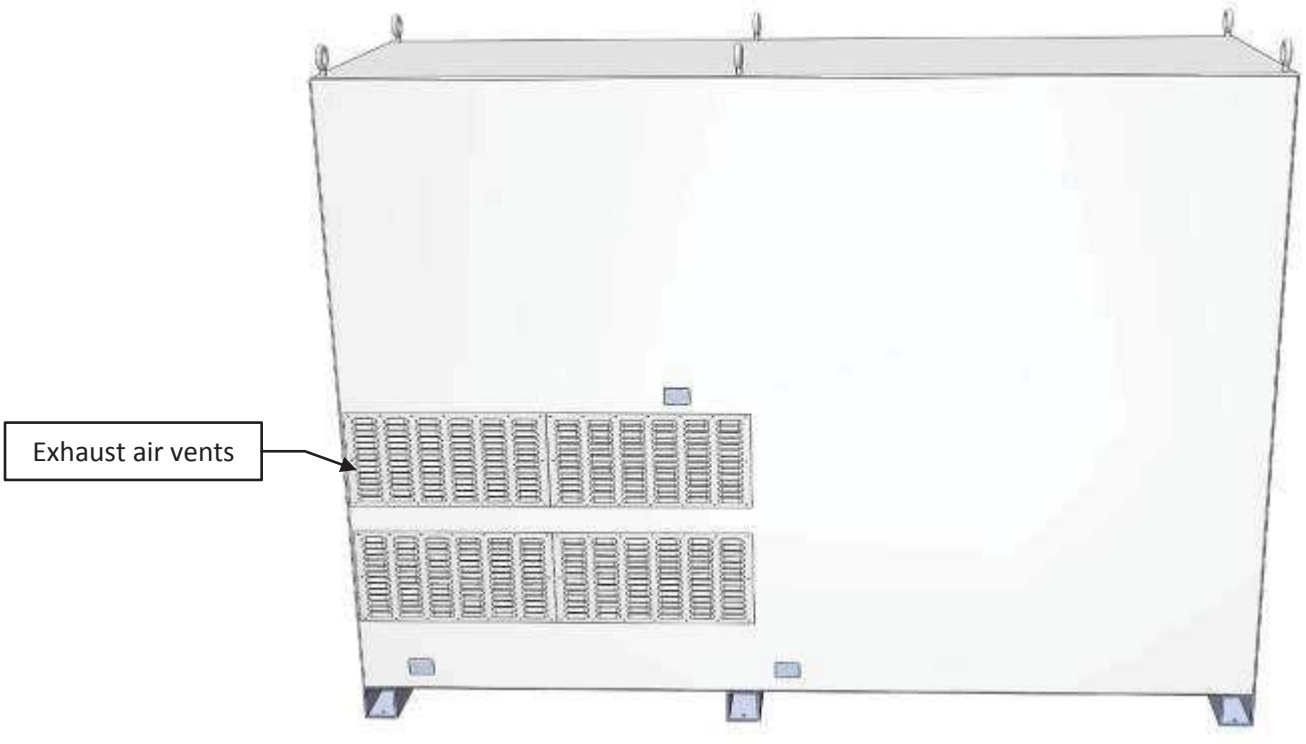
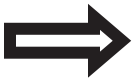


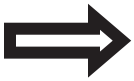
Figure 1.3 – The SGI Inverter (Rear)

2.0 Site Preparation and Inverter Placement

The inverter is comprised of a rainproof industrial enclosure containing electrical and electronic components and AC and DC integrated disconnecting means.



NOTE: If the inverter is mounted outside, ensure that the enclosure doors remain closed during the installation process in case of rain or snow. Leaving these doors open during installation will void the warranty.



NOTE: If the inverter is to be stored outdoors before being installed and commissioned, care must be taken to avoid condensation inside the unit. Removing the protective shipping wrap and placing a small space heater inside the unit can help minimize the amount of condensation that can occur during onsite outdoor storage.

Criteria for device mounting:

- Because the power electronics are within the rainproof main enclosure, the inverter can be mounted outdoors.
- The maximum life for the inverter can be achieved by mounting the unit in a clean, dry and cool location.
- For optimal electrical system efficiency, use the shortest possible AC and DC cables and use the maximum allowable cable size.
- Avoid installation in close proximity to people or animals, as there is an audible high-frequency switching noise.
- Install the inverter in an accessible location following NEC codes for enclosure and disconnect door clearances and proximity to other equipment.
- Although the inverter is designed to function at full power continuously in up to 50^{o}C ambient temperatures, for optimal inverter life and performance, do not mount the inverter in direct sunlight, especially in hot climates. If the unit must be mounted in direct sunlight a metal sun-shield is recommended. It is recommended that the inverter is mounted on the north side of buildings or on the north side of a ground mount PV array.

CAUTION: Please follow these guidelines:

- Be sure to verify load capacity of floor, roof or concrete pad mounting area.

Inverter Model	Weight	Fork Lift
SGI 500	6980 lbs.	8000 lbs
SGI 300, 266, 250	5650 lbs.	6000 lbs
SGI 225	5170 lbs	6000 lbs

Table 2.1 – Weight and Required Fork Lift Capacity

- The ambient temperature must be between –40°C and +50°C for full power, continuous operation. The inverter will automatically reduce power or may shut down to protect itself if ambient air temperature at the intake rises above 50°C.

- The National Electrical Code (NEC) requires that the inverter be connected to a dedicated circuit and no other outlets or device may be connected to this circuit. See NEC Article 690. The NEC also imposes limitations on the size of the inverter and the manner in which it is connected to the utility grid. See NEC Article 690 for guidance within the US.

- A minimum distance of 18 inches must be clear *behind* the inverter for cooling air exhaust and service access. A clearance distance of 36 inches behind the inverter is highly recommended to aid in cleaning the exhaust screens.

- A minimum distance of 12 inches must be clear *above* the inverter for ventilation.

- A minimum distance of 6 inches must be clear to the *sides* of the inverter.

- If you are installing the inverter in a utility vault or electrical closet, the air circulation must be sufficient for heat dissipation. Provide external ventilation to maintain an ambient condition of less than 50°C. The ambient temperature should be kept as low as possible at all times for optimal inverter operation and life.

Model	Max. heat loss
SGI 500	55000 Btu/hr
SGI 300	32000 Btu/hr
SGI 266	28000 Btu/hr
SGI 250	26000 Btu/hr
SGI 225	24000 Btu/hr

Table 2.2 – Indoor Cooling Requirements

2.1 Inverter Positioning

Correct mounting position for the inverter is vertical with the mounting feet on the floor. This diagram shows the basic inverter footprint dimensions:

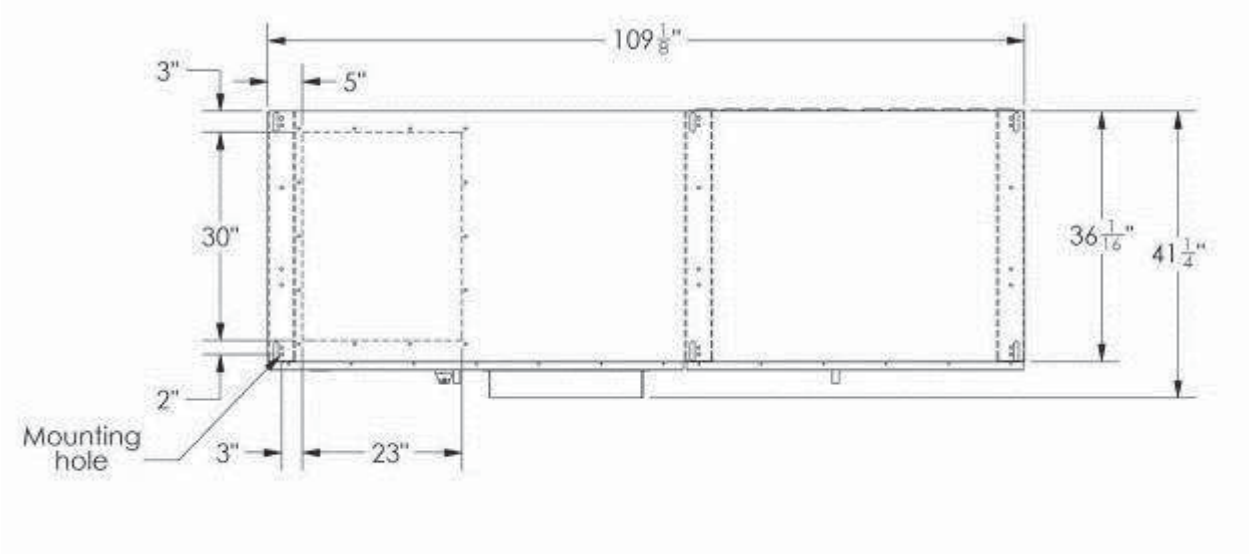


Figure 2.1 – SGI Series Dimensions (Top View)

2.2 Leveling the Inverter

The inverter must be mounted on a flat and level plane in order for proper operation of the doors and integral DC disconnect and AC breaker. To check if the inverter is properly leveled, the top of each pair of doors should be aligned with one another. If the top edges are not aligned, level the inverter by placing aluminum shims under the appropriate mounting foot prior to securing the inverter.

Acceptable Door Alignment

Incorrect Door Alignment

Figure 2.2 – Leveling the Inverter for Proper Door Alignment

NOTE: Failure to properly level the inverter may cause damage to the enclosure, resulting in water infiltration or degradation of the enclosure.

NOTE: Failure to properly level the inverter may cause damage to the operating mechanisms of the integral DC disconnect and AC breaker.

2.3 Mounting Details

The inverter includes mounting feet with 6 holes (1/2”, 12mm diameter) on a rectangular pattern for attaching the inverter. Note that the outer 4 mounting holes are 2” inside each corner of the main inverter enclosure.

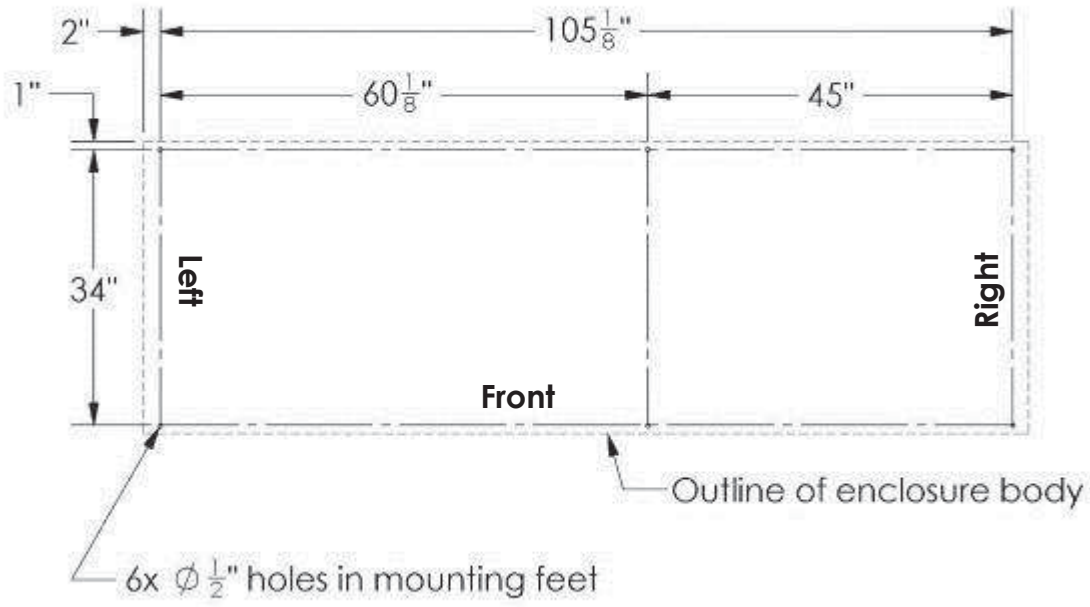


Figure 2.3 – SGI Series Mounting Pattern (Top View)

It is recommended to use six hot dip galvanized grade 5 or 8 steel bolts or stainless steel bolts for mounting the feet. The correct bolt size is 3/8” (10mm) diameter. Use a heavy lock washer and flat washer with each bolt. Alternatively, a “toe-plate” can be used at the end of each 4x4” tube foot. After mounting is completed, remove shipping aids from front shrouds and inside unit.

WARNING: Severe injury or death could occur if the inverter mounting fails and the unit tips over or falls on a person.

NOTE: The weight of the inverter will exert an added load to floor, roof or pad where mounted. Be sure to verify proper load capacity of mounting surface.

NOTE: If the roof/floor mounting only uses the inverter’s mounting feet, be sure all 6 available foot mount bolt positions are used to secure the inverter.

2.4 DC and AC Wire Entry Points

AC and DC wiring must enter through the provided conduit cutout in the bottom of the inverter enclosure or through the alternate conduit entries. Alternative locations are the left side for DC and back panel for AC.

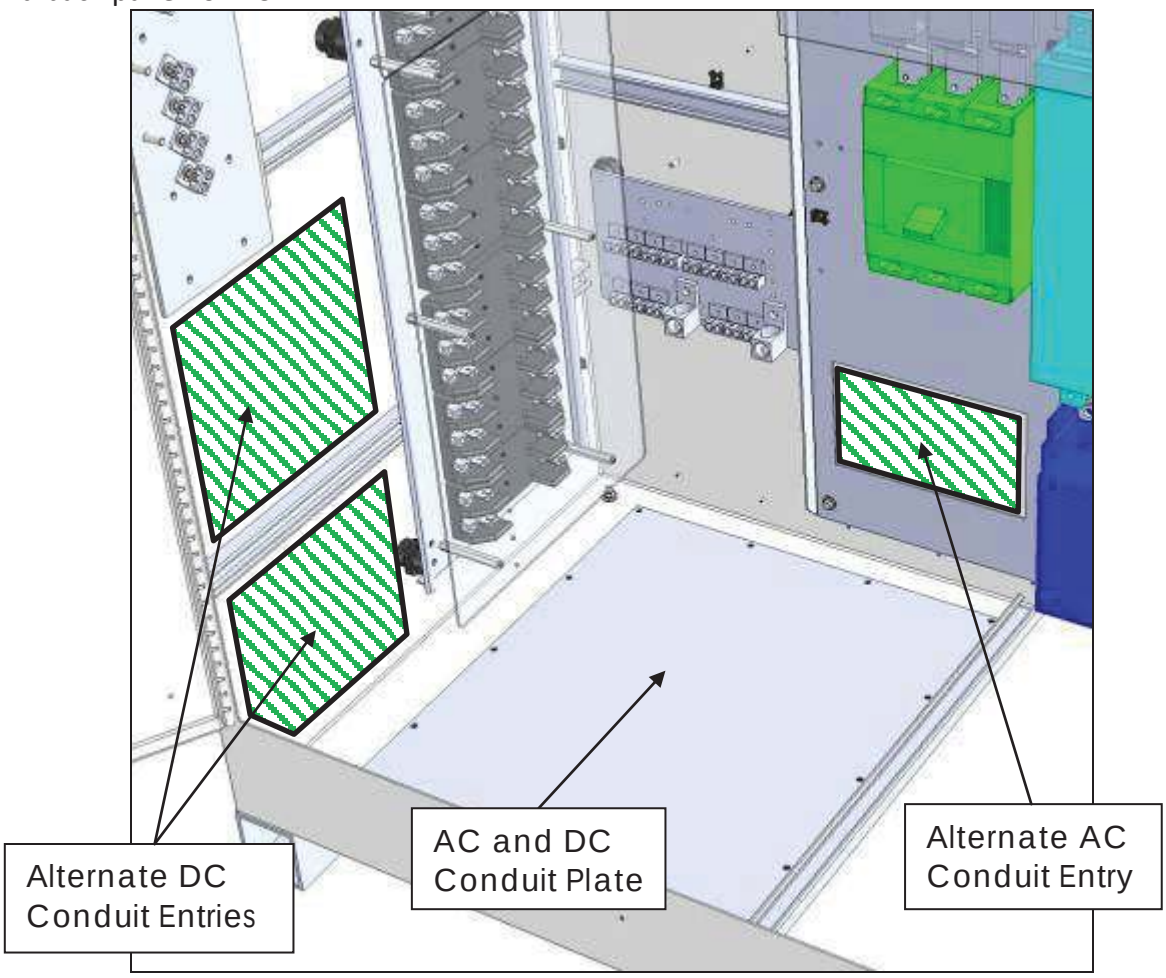


Figure 2.4 – AC and DC Conduit Entry Points

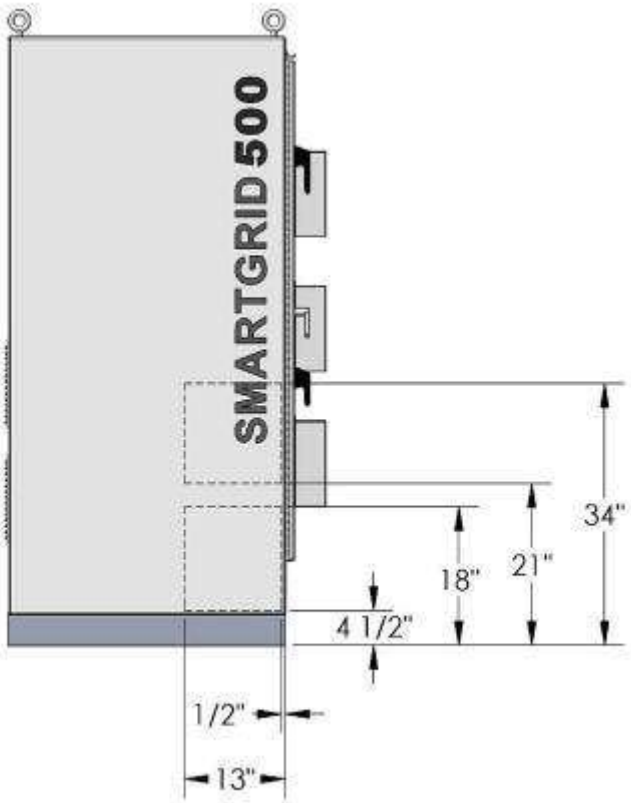


Fig 2.5 – Alternate DC Conduit Entry Locations

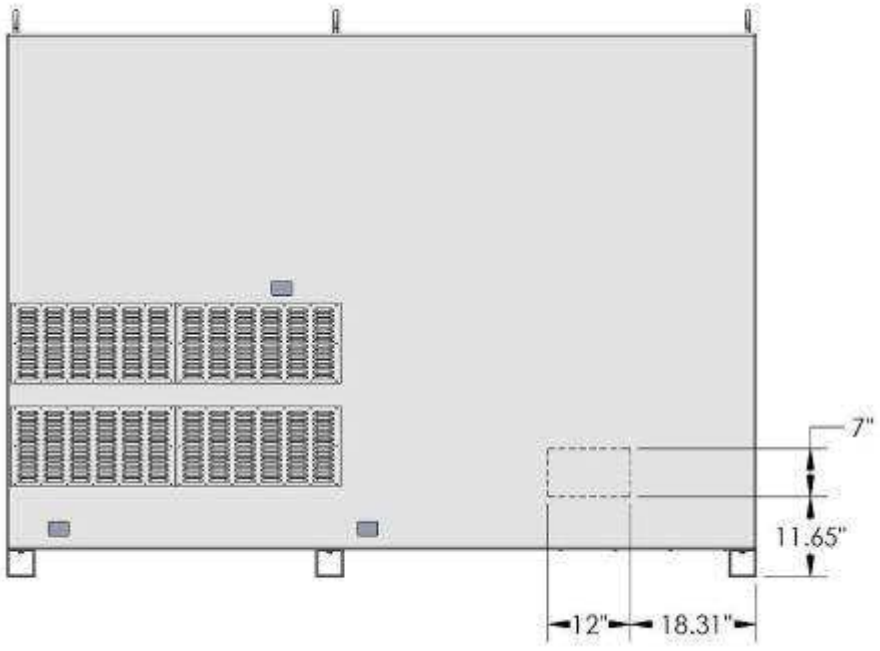


Figure 2.6 – Alternate AC Conduit Entry Location

3.0 Installation

WARNING: Before installing the inverter, read all instructions and caution markings in this manual and on the inverter as well as on the photovoltaic modules.

WARNING: Electrical installation shall be performed in accordance with all local electrical codes and the National Electrical Code (NEC), Canadian Electrical Code for Canada (CEC), NFPA 70.

WARNING: Connecting the inverter to the electric utility grid must only be completed after receiving prior approval from the utility company and installation performed only by qualified personnel/licensed electrician(s).

3.1 Checking for Shipping Damage

The inverter is thoroughly checked and tested rigorously before it is shipped. Even though it is bolted onto a rugged, oversized pallet for delivery, the inverter can be damaged during shipping by poor handling, trucking or transfer station activity.

Please inspect the inverter thoroughly after it is delivered. If any damage is seen please immediately notify the shipping company to make a claim. If there is any question about potential shipping damage, contact Solectria Renewables. Photos of the damage may be helpful in documenting potential shipping damage.

- Do not accept the unit if it is visibly damaged or if you note visible damage when signing shipping company receipt.
- Note damage on shipping papers with the truck driver! Report damage immediately to the shipping company.
- Do not remove the unit from pallet/packaging if damage is evident.
- If it is determined that the unit must be returned, a RMA number must be obtained from Solectria Renewables prior to shipping the unit back.

3.2 Inverter Mounting

WARNING: The inverter may tip over if improperly moved, potentially causing damage to equipment, personal injury or death.

- Note the center of gravity to guide lifting methods.
- Do not tilt the pallet or inverter while moving it.
- Safety chains and straps must be used to prevent any possible tilting or shifting of the inverter in any direction while being lifted.

WARNING: Do not install the inverter on or over combustible surfaces or materials.

3.3 Removing Inverter from Pallet and Moving Inverter Into Place

It is recommended to keep the inverter secured to the pallet and moved as close as possible to the final location prior to removing the pallet. To remove the securing bolts use a 9/16” socket and/or wrench. Completely remove each nut and bolt from the pallet.

The center of gravity of the inverter is well to the right of center and is marked with a label on the left door of the transformer enclosure (right half of the enclosure).

Use an 8,000lb capable forklift for the SGI 500 or 6,000lb capable forklift for the SGI 225-300 if lifting from the bottom. The forks should be set to an inside spacing so they fit just to the left of the inverter's 4” x 4" aluminum tube feet.

Before lifting, make sure forks are against the left edges of both the right most foot and center foot and install safety chains (with failsafe hooks) to prevent inverter from sliding off forklift (see following diagrams).

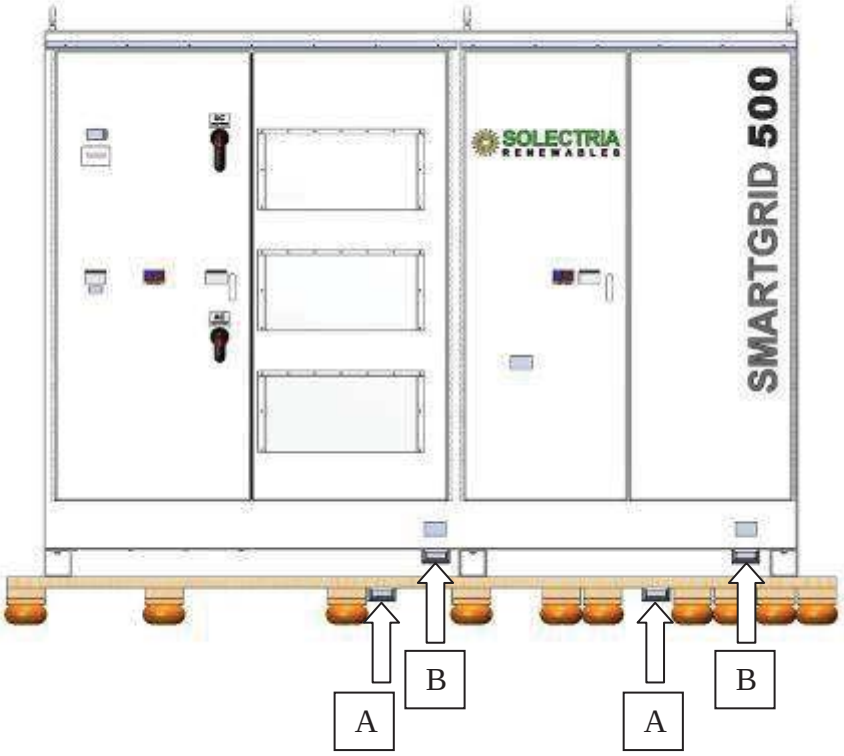


Figure 3.1 – Forklift Lifting Positions
Use positions A when lifting or moving the inverter while attached to the pallet
Use positions B when lifting or moving the inverter removed from the pallet

Note that the lifting diagrams show the inverter being lifted while mounted on the shipping pallet. If the inverter is lifted without the shipping pallet, a properly rated safety strap must be placed over the top of the inverter firmly holding it down on the lifting devices forks. It is recommended to use two lifting straps, one holding the inverter to the left fork and another to the right fork.

NOTE: Failure to follow these lifting guidelines may cause structural damage to the inverter and void the warranty.

Alternatively, the inverter can be lifted using the lifting eyes on the top. If using this lifting method, lift with vertical chains and hooks connected to a proper lifting device. **Do not lift with an "A" chain between the two eyes left-to-right as this will result in permanent damage to the inverter.** At a minimum, use 3 "A" chain sets going front-to-rear with each side of the "A" having a chain length of 4 feet minimum. Each "A" chain must be tensioned equally. The recommended method is a 3 beam hoist with 6 equal-length tensioned chains hanging down, one over each eye bolt. An A-frame can then be used above the 3 beams. **Never lift only by the outer 4 eyebolts as this will damage the inverter.**

Figure 3.2 – Preferred Straight-Chain Lifting Method

Figure 3.3 – Minimum Requirements for Eyebolt Lifting

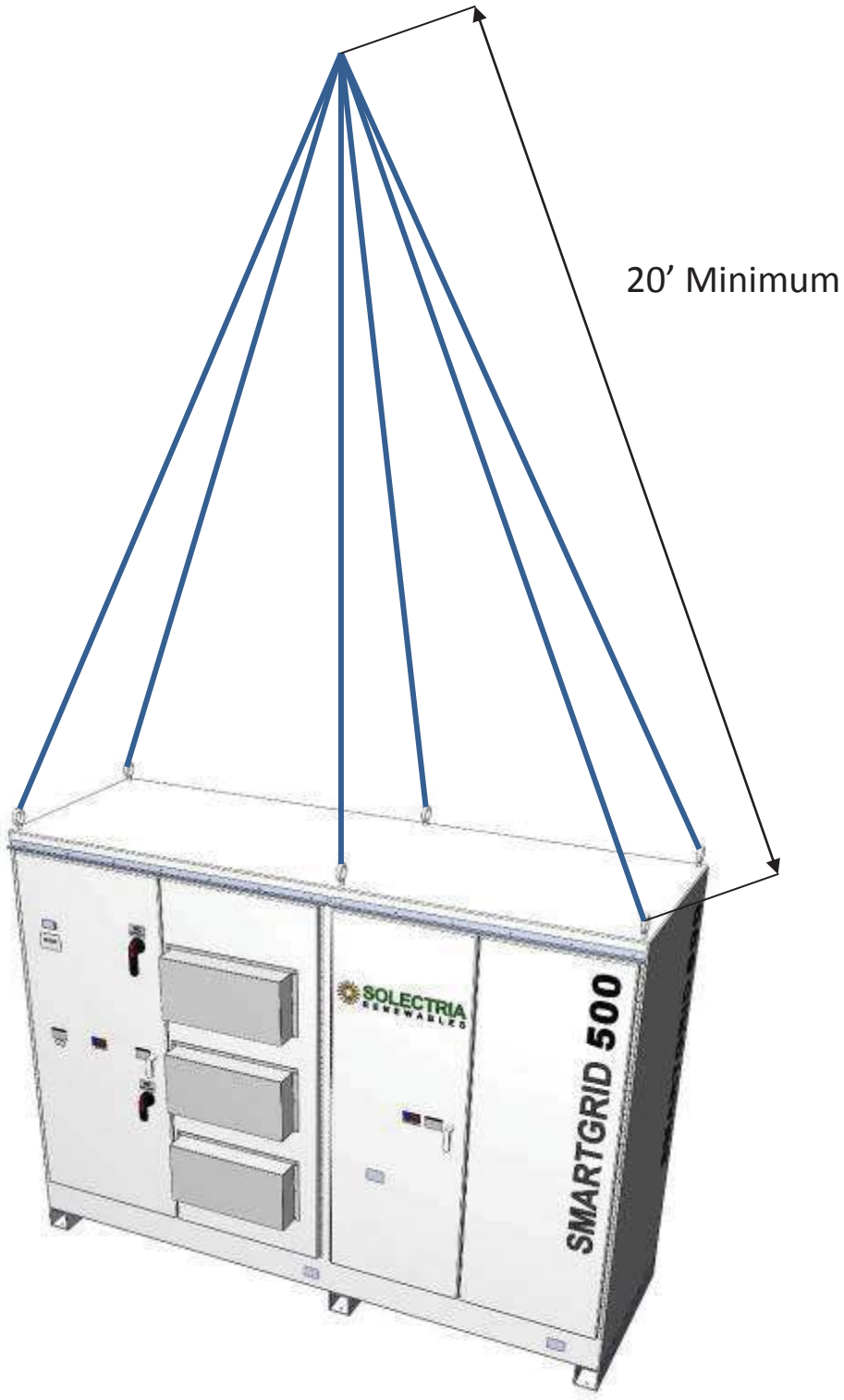


Figure 3.4 – Marginal Lifting Method

Figure 3.5 – Improper Lifting Method

4.0 DC Connections from the PV Array and AC Connections to the Electrical Utility Grid

WARNING: All electrical installations shall be performed in accordance with all local electrical codes and the National Electrical Code, Canadian Electrical Code for Canada and NFPA 70. Only make AC connections directly to the AC breaker and DC connections to the DC subcombiner panel.

4.1 Grounding Electrode Conductor (GEC)

As with all PV systems, a Grounding Electrode Conductor must be installed per NEC 690. This conductor should be sized according to NEC requirements. Both a DC and AC GEC may be required at the inverter in some instances. Two lug positions are provided on the ground bond plate for the AC and DC grounding electrode conductors.

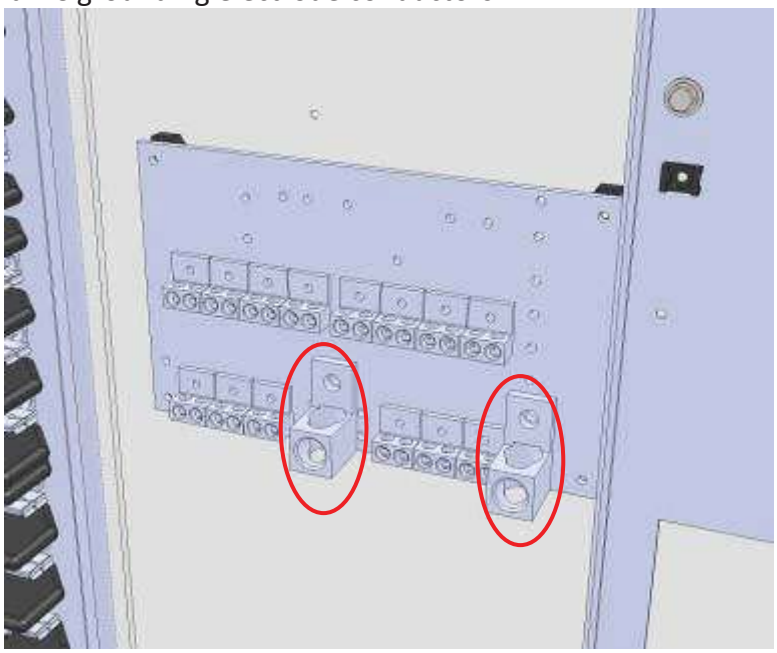


Figure 4.1 - AC and DC GEC Lug Positions

Cu or Al Conductors Max. 1 x 1/0AWG-750kcmil 75C connections, 550 in-lbs 1 wire per lug or Max. 2 x 1/0AWG-300kcmil 75C connections, 550 in-lbs 2 wires per lug

WARNING: Make sure to establish a solid connection from the inverter to the system grounds before proceeding to connect any DC or AC power wires.

4.2 Equipment Grounding Conductor (EGC)

The ground bond plate is also equipped with a number of provisions for equipment grounding conductors. In most instances, these will be used for the equipment grounds originating at the combiner boxes used to feed the subcombiner positions within the inverter.

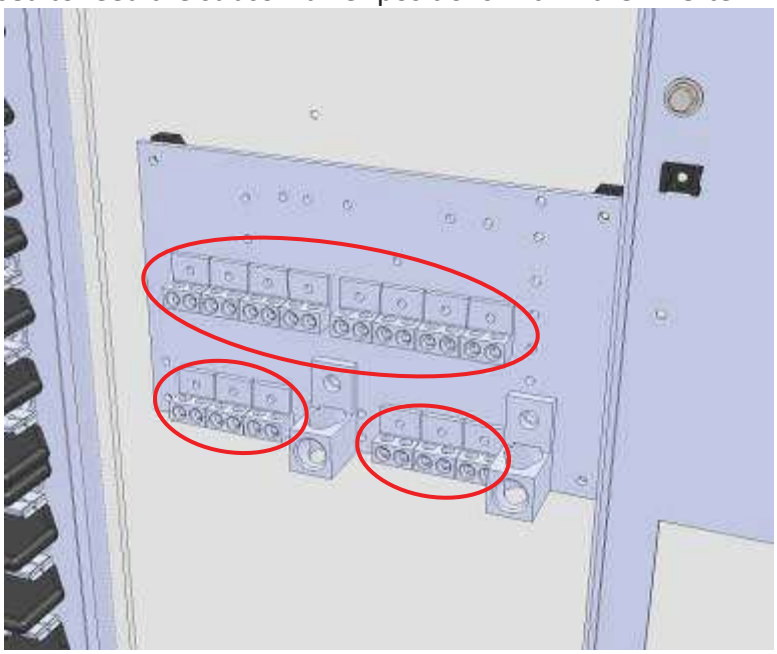


Figure 4.2 - EGC Lug Positions

Cu or Al Conductors Max. 28 x 14AWG-1/0AWG 75C connections, 50 in-lbs 1 wire per lug position

4.3 DC Subcombiner Wiring

WARNING: Before terminating AC or DC conductors at the inverter, ensure that the conductors are deenergized by turning any AC and DC disconnects off, building AC source circuits or breakers off and disconnect the PV module strings (or ensure that the modules are covered).

WARNING: Before connecting the DC conductors of the PV array to the subcombiner, verify the polarity of the conductors.

WARNING: Before connecting the DC conductors of the PV array to the subcombiner, verify that the DC voltage is less than 600V DC. The PV array open circuit voltage must be below 600V DC (V_{pv} < 600V DC) under all conditions per NEC 690. Please read the Technical Info section for details. Any DC voltage over 625V will damage the inverter and void the warranty.

WARNING: Fuses in the inverter's ungrounded, fused subcombiner must only be replaced with the same type and rating (600VDC) fuses as originally installed.

The SGI series of inverters must be ordered with either an integral subcombiner populated with DC fuses *or* an integral subcombiner populated with DC breakers. Many choices are available to meet any design constraint.

For the 225-400A fused or breaker subcombiner, choose any combination of current ratings from 225A, 250A, 300A, 350A or 400A.

For the 110-200A fused or breaker subcombiner, choose any combination of current ratings from 110A, 125A, 150A, 175A or 200A.

For the 70-100A fused subcombiner (no breaker option in this class), choose any combination of fuse values from 70A, 80A, 90A or 100A.

Either copper or aluminum wire may be used for the DC (PV) positive and negative conductors, although due to terminal size restrictions, aluminum wire may not be an option for all cases. As with any aluminum wire exercise best industry practices to ensure a reliable connection; thoroughly clean the conductor just prior to making the electrical connection and use an oxide inhibitor to prevent the formation of aluminum oxide.

The fused subcombiner plate is populated with a number of fuse holders in a variety of configurations designed to meet numerous array designs.

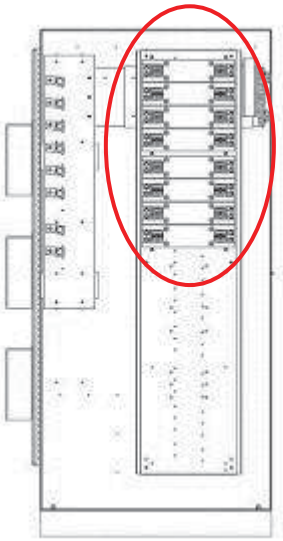
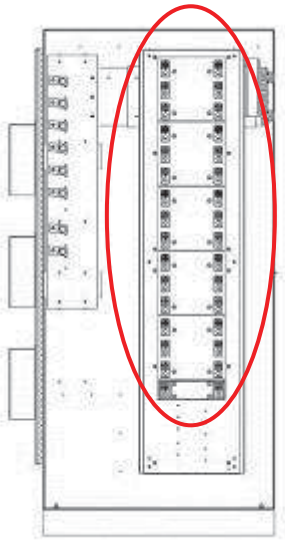
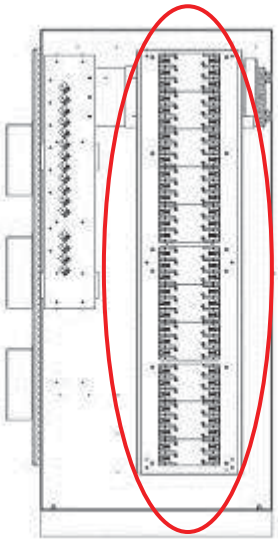
		
SGI 500: 8 positions 225 – 400A 600VDC fuses SGI 225-300: 6 positions 225 – 400A 600VDC fuses	SGI 500: 16 positions 110 – 200A 600VDC fuses SGI 225-300: 12 positions 110 – 200A 600VDC fuses	SGI 500: 32 positions 70 – 100A 600VDC fuses SGI 225-300: 24 positions 70 – 100A 600VDC fuses
Cu or Al Conductors Max. 16 x 2AWG-300kcmil 75C connections, 275 in-lbs 1-2 wires per fuse position	Cu or Al Conductors Max. 16 x 2AWG-300kcmil 75C connections, 375 in-lbs 1 wire per fuse position	Cu or Al Conductors Max. 32 x 6AWG-1/0AWG 75C connections, 100 in-lbs 1 wire per fuse position

Table 4.1 – DC Ungrounded Inputs, Fused Subcombiner

NOTE: Not all of the fused positions will be used in all designs. In the case that not all of the positions will be used, the inverter will ship with spare fuses in the unused locations. The locations of the used and unused positions will be clearly labeled on the shield that covers the exposed terminals. The installer *must* follow the labeling for the used connections to ensure proper functionality of the inverter. Failure to follow the labeling may cause the inverter not to be able to sense the DC voltage, preventing the inverter from turning on.

The grounded subcombiner plate that accompanies the fused subcombiner is populated with a number of lugs of the appropriate size to match the wiring inputs of the fused subcombiner.

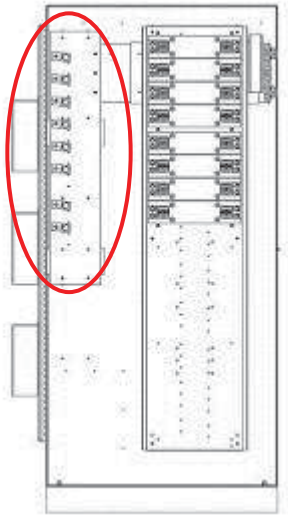
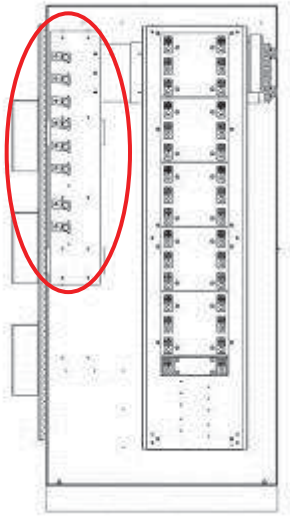
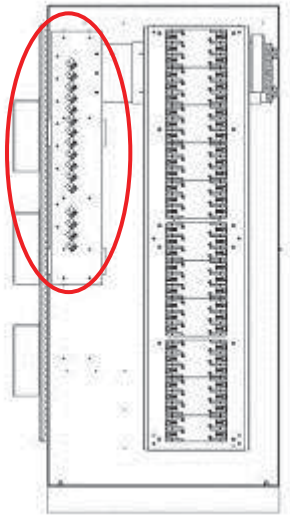
 SGI 500: 8 positions 8 lugs SGI 225-300: 6 positions 6 lugs	 SGI 500: 16 positions 8 lugs (two wires per lug) SGI 225-300: 12 positions 6 lugs (two wires per lug)	 SGI 500: 32 positions 16 lugs (double lugs) SGI 225-300: 24 positions 12 lugs (double lugs)
Cu or Al Conductors Max. 16 x 2AWG-300kcmil 75C connections, 550 in-lbs 1-2 wires per lug	Cu or Al Conductors Max. 16 x 2AWG-300kcmil 75C connections, 550 in-lbs 2 wires per lug	Cu or Al Conductors Max. 32 x 6AWG-1/0AWG 75C connections, 50 in-lbs 1 wire per lug position

Table 4.2 – DC Grounded Inputs, Fused Subcombiner

The grounded DC connections are bonded to the ground system within the inverter through the ground fault detection and interrupt (GFDI) circuit. The PV grounded connections should not be bonded to the ground system at any other point. The PV ungrounded connections must never be bonded to the ground system at any time.

WARNING: The PV grounded connections should not be bonded to the ground system at any point outside of the inverter. This bond is made in the GFDI circuit that is integral to the inverter.

The breaker subcombiner plate is populated with a number of 600VDC breakers in a variety of configurations designed to meet numerous array designs.

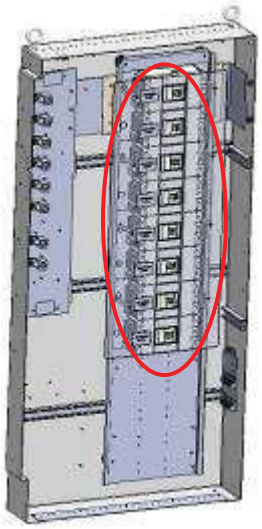
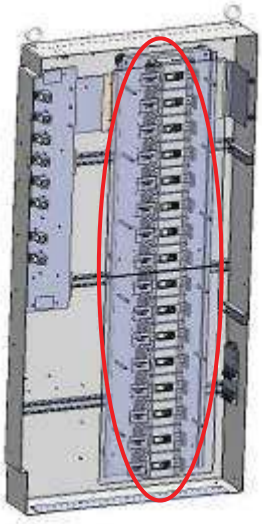
 SGI 500: 8 positions 225 – 400A 600VDC breakers SGI 225-300: 6 positions 225 – 400A 600VDC breakers	 SGI 500: 16 positions 110 – 200A 600VDC breakers SGI 225-300: 12 positions 110 – 200A 600VDC breakers
 Cu or Al Conductors Max. 8 x 4/0AWG-500kcmil 75C connections, 375 in-lbs (3/8” hex) 1 wire per breaker position *or* Max. 16 x 2/0AWG-250kcmil 75C connections, 275 in-lbs (5/16” hex) and 375 in-lbs (3/8” hex) 2 wires per breaker position	 Cu or Al Conductors Max. 16 x 2AWG-300kcmil 75C connections, 275 in-lbs 1 wire per breaker position

Table 4.3 – DC Ungrounded Inputs, Breaker Subcombiner

NOTE: Not all of the breaker positions will be used in all designs. In the case that not all of the positions will be used, the inverter will ship with breakers in the unused locations. The locations of the used and unused positions will be clearly labeled on the shield that covers the exposed terminals. The installer *must* follow the labeling for the used connections to ensure proper functionality of the inverter. Failure to follow the labeling may cause the inverter not to be able to sense the DC voltage, preventing the inverter from turning on.

The grounded subcombiner plate that accompanies the breaker subcombiner is populated with a number of lugs of the appropriate size to match the wiring inputs of the breaker subcombiner.

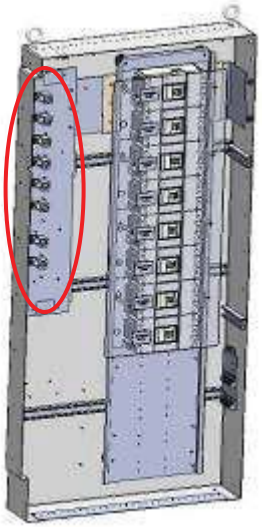
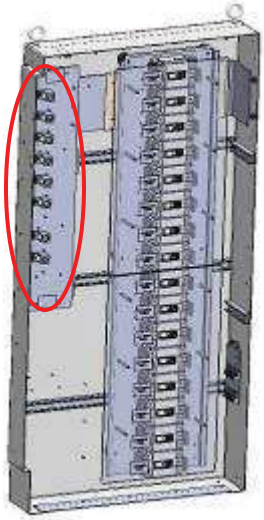
 SGI 500: 8 positions 8 lugs SGI 225-300: 6 positions 6 lugs	 SGI 500: 16 positions 8 lugs (two wires per lug) SGI 225-300: 12 positions 6 lugs (two wires per lug)
Cu or Al Conductors Max. 8 x 4/0AWG-500kcmil 75C connections, 550 in-lbs 1 wire per lug *or* Max. 16 x 2/0AWG-250kcmil 75C connections, 550 in-lbs 2 wires per lug	Cu or Al Conductors Max. 16 x 2AWG-300kcmil 75C connections, 550 in-lbs 2 wires per lug

Table 4.4 – DC Grounded Inputs, Breaker Subcombiner

The grounded DC connections are bonded to the ground system within the inverter through the ground fault detection and interrupt circuit (GFDI). The PV grounded connections should not be bonded to the ground system at any other point. The PV ungrounded connections must never be bonded to the ground system at any time.

WARNING: The PV grounded connections should not be bonded to the ground system at any point outside of the inverter. This bond is made in the GFDI circuit that is integral to the inverter.

4.4 DC Ground Fault Detection and Interruption

Every SGI inverter is equipped with an automatic DC Ground Fault Detection and Interruption (GFDI) circuit. When a single ground fault on an ungrounded circuit exceeding the pickup value is present in the PV array or in the DC wiring to the inverter, the DC GDFI breaker will trip and a ground fault will be signaled by means of a yellow LED and a message on the front LCD display.

Breaker TRIPPED DC GROUND FAULT INDICATED	Breaker ON NO GROUND FAULT DETECTED

Figure 4.3 – Operating Positions of GFDI Breaker

	DC Ground Fault Current Pickup	Maximum Trip Time
SGI 225/250	4 A	1 s
SGI 266/300/500	5 A	1 s

Table 4.5 – DC GFDI Specifications

WARNING: In the event of a ground fault, DO NOT TOUCH any equipment (including, but not limited to: the inverter, the PV array disconnects, the PV array combiners, the PV panels, the PV racking system). Immediately contact the installer or another qualified person to locate and repair the source of the ground fault. Be aware that normally grounded conductors and equipment may be energized and may pose a significant shock and / or fire hazard.

WARNING: If the GFDI breaker trips upon connection of one or more combined strings, a ground fault in the array must be located and eliminated before proceeding. The DC ground fault is eliminated when the GFDI breaker can be engaged into its lever-up position and remain in that position. Failure to obey these instructions may cause the grounded conductor to rise to potentially unsafe voltage levels.

WARNING: Even when the DC disconnect is in the off position, the ungrounded DC conductor leading up to the DC disconnect will remain live on the PV side as long as the PV modules are in daylight. The inverter side of the DC disconnect will also remain live after the disconnect has been shut off until 60 seconds after the LEDs turn off, as DC bus capacitors in the inverter discharge.

4.5 AC Wiring

The SGI series of inverters must be connected to the grid with three phase conductors and the appropriate AC grounding conductors. No neutral conductor is required for the inverter to operate. However, some utilities or jurisdictions may require that a neutral connection be made from the onsite electrical service directly to the inverter's transformer in order to meet their effective grounding requirements. Therefore, the installer may land a neutral conductor or a set of neutral conductors directly on the neutral terminal of the inverter's integrated transformer. The inverters are designed with a routing path through the inverter enclosure and a means for connecting these conductors to accommodate this requirement.

Each SGI inverter includes an integrated AC breaker that serves as the connection point for the AC phase wiring to the onsite electrical service or grid connection. The integrated breaker will have different ratings depending on the inverter model.

Model	Ampere Rating	Interrupt Rating	100% Rated
SGI 225-480VAC	400A	25 kAIC	No
SGI 250-480VAC	400A	35 kAIC	No
SGI 266-480VAC	400A	35 kAIC	No
SGI 300-480VAC	400A	35 kAIC	Yes
SGI 500-480VAC	800A	65 kAIC	No

Table 4.6 – Factory Included AC Breaker Minimum Specifications

If the onsite electrical service connection is designed with an overcurrent protection device (OCPD), it must be dedicated to the PV system and must be adequately rated for the current delivered by the inverter as required by NEC 690. See NEC 690, NEC 705 and NEC 240 for guidance on sizing the building OCPD. The table below summarizes the inverter's required ampere rating for nominal 125% rated OCPDs; these ratings may change depending on the interconnect design and whether or not 100% rated OCPDs are used.

Model	Ampere Rating
SGI 225-480VAC	350A
SGI 250-480VAC	400A
SGI 266-480VAC	400A
SGI 300-480VAC	450A
SGI 500-480VAC	800A

Table 4.7 – Nominal 125% Rated Building Backfeed OCPD Ampere Ratings

The grid impedance value at the connection point should be as low as possible to avoid an increase of the AC voltage to non-permissible values while the inverter feeds power to the grid. Designing for less than 1% AC phase-to-phase voltage rise is recommended. Minimizing wiring impedance also results in higher system efficiency.

Connect the building's three phase conductors into the bottom of the integrated AC breaker as shown below. Phase A should connect to the leftmost position of the breaker, phase B to the middle position and phase C to the rightmost position.

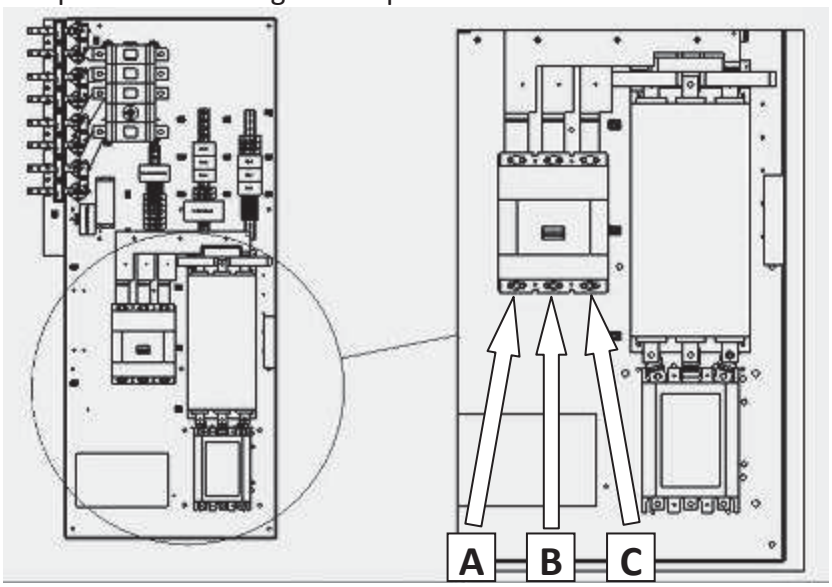
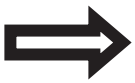


Figure 4.4 – AC Phase Wire Connection Points

Use minimum 90°C (194°F) rated wire to connect to the inverter's integrated three-phase AC breaker. See NEC 310 regarding temperature ratings of wire. Follow local codes to determine minimum wire gauge and temperature rating of the wires. Voltage drop and other considerations may dictate that larger wire sizes be used.

Model	Maximum Number of Terminals per Phase	Minimum Wire Size	Maximum Wire Size	Terminal Torque
SGI 225-480VAC	2	3/0AWG	500kcmil	275 in-lbs
SGI 250-480VAC	2	3/0AWG	500kcmil	275 in-lbs
SGI 266-480VAC	2	3/0AWG	500kcmil	275 in-lbs
SGI 300-480VAC	2	4/0AWG	500kcmil	275 in-lbs
SGI 500-480VAC	3	250kcmil	400kcmil	375 in-lbs

Table 4.8 – Factory Included AC Breaker Phase Wire Size Limits



The SGI series of inverters require a clockwise phase sequence for proper operation. If a phase sequence error is displayed on the screen during commissioning of the inverter, simply swap any two phases to correct the phase sequence.

Either copper or aluminum wire may be used for the AC phase and optional neutral conductors, although due to terminal size restrictions, aluminum wire may not be an option for all cases. As with any aluminum wire exercise best industry practices to ensure a reliable connection; thoroughly clean the conductor just prior to making the electrical connection and use an oxide inhibitor to prevent the formation of aluminum oxide.

The table below describes the routing path and connection methodology for the optional neutral conductors that may be connected to the inverter's transformer to satisfy effective grounding requirements. The inverter enclosure is designed with a routing path to allow for proper bending space of these conductors, and therefore the path shown below should be followed. The transformer's neutral bar has also been designed with a set of holes to allow for various field connections such as a box lug or a crimped lug.

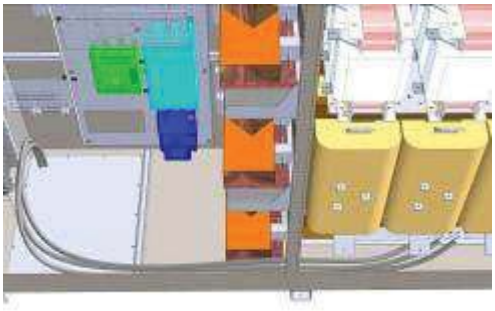
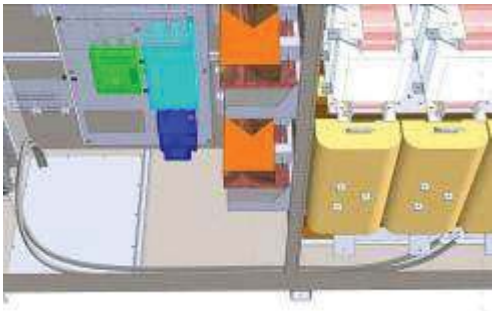
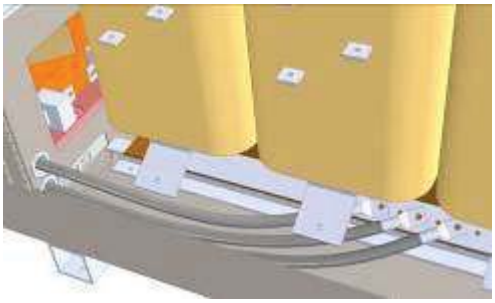
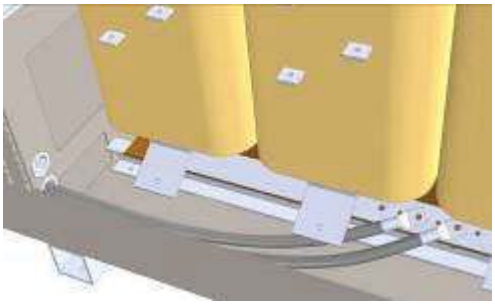
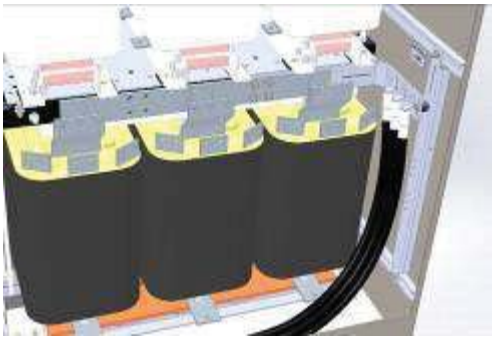
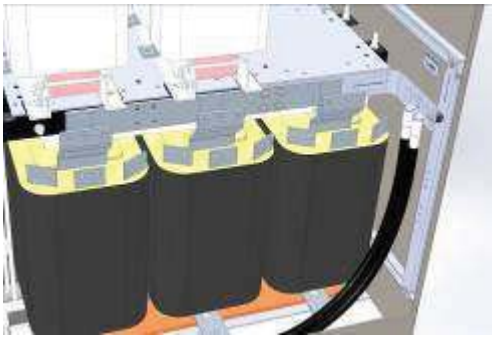
 SGI 500 Neutral Routing Path	 SGI 225-300 Neutral Routing Path
 SGI 500 Neutral Landing Location	 SGI 225-300 Neutral Landing Locations
 SGI 500 Alternate Transformer Neutral Location	 SGI 225-300 Alternate Transformer Neutral Location
Cu or Al Conductors Max. 3 x 1/0AWG-400kcmil 75C connections 3 x 1/2" holes, 3 x 3/8" holes 1 connection per hole	Cu or Al Conductors Max. 2 x 1/0AWG-500kcmil 75C connections 3 x 1/2" holes, 3 x 3/8" holes 1 connection per hole

Table 4.9 – Optional Neutral Routing and Connections

4.6 AC Ground Fault Detection

The SGI series of inverters are not equipped with AC ground fault protection. When AC ground fault protection is used on the onsite electrical service, determine if the ground fault device is listed to be backfed. The inverter AC output should be connected on the supply side of the device unless the device is specifically listed for a backfeed application, then the inverter may be installed on either the load or supply side of the device. Always consult the AC ground fault manufacturer for guidance on backfeeding their devices in a Code compliant manner.

4.7 Lightning and Surge Protection

The SGI series is designed with certain protections against surges in voltage including certification to ANSI/IEEE 62.41/62.42. However, added protection and solid grounding provisions are important for best protection against utility surges and surges created by indirect lightning strikes.

The installation of a UL listed lightning arrester of the correct specification is recommended on both the DC and AC inputs of the inverter. This should be installed and wired using the manufacturer's installation instructions. This device gives important added protection from indirect lightning strikes and the resulting voltage surges that provide protection beyond the inverter's IEEE 1547 requirements.

The best protection against damage from lightning and other voltage surge sources is proper grounding of the system. When required by local codes, it is recommended to establish a grounding electrode system specifically for the PV array, located as close as practical to the array. It is also recommended to have the lightning protection system of the building checked and upgraded if needed before the PV system is installed. These added protections are especially important for areas prone to thunder storms and possible nearby lightning strikes. Although these added precautions will not guarantee that there will be *no* damage from lightning, they can help prevent or limit potential damage.

4.8 Remote Shutdown Wiring

The SGI series of inverters feature a remote shutdown input to allow for advanced remote command and control systems. The input required is an isolated 24VDC signal that is wired to the terminal blocks on the back panel of the inverter by the installer. Once the signal is activated, the inverter will slowly ramp down power and then disconnect from the grid. The inverter will not reconnect until the signal is removed. The remote shutdown feature will not result in an instantaneous shutdown of the inverter.

Maximum Shutdown Ramp Time	Nominal Input Voltage	Minimum Input Voltage	Maximum Input Voltage	Minimum Current Capability	Terminal Wire Size	Terminal Torque (if screw type)
4 seconds	24VDC	21.6VDC	26.4VDC	100mADC	26 – 14AWG	4 in-lbs

Table 4.10 – Remote Shutdown Specifications

Begin by locating a set of terminal blocks that are identified as Block 2 on the back panel of the inverter (refer to the diagram below). Wire the positive conductor to the left bottommost position on Terminal Block 18. Wire the return conductor to the left bottommost position on Terminal Block 19.

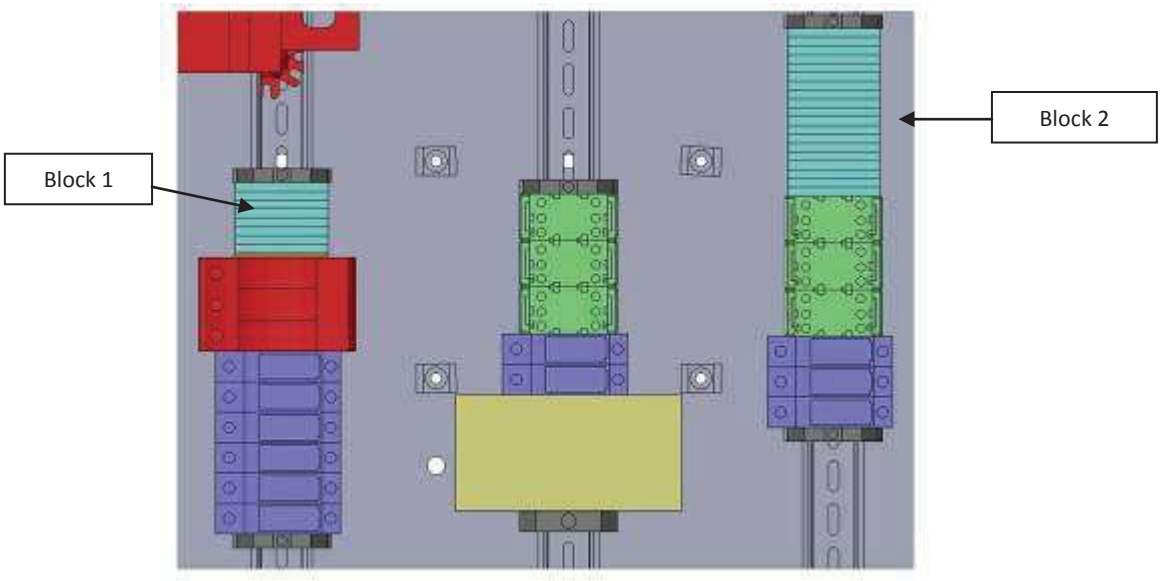


Figure 4.5 – Terminal Block Locations

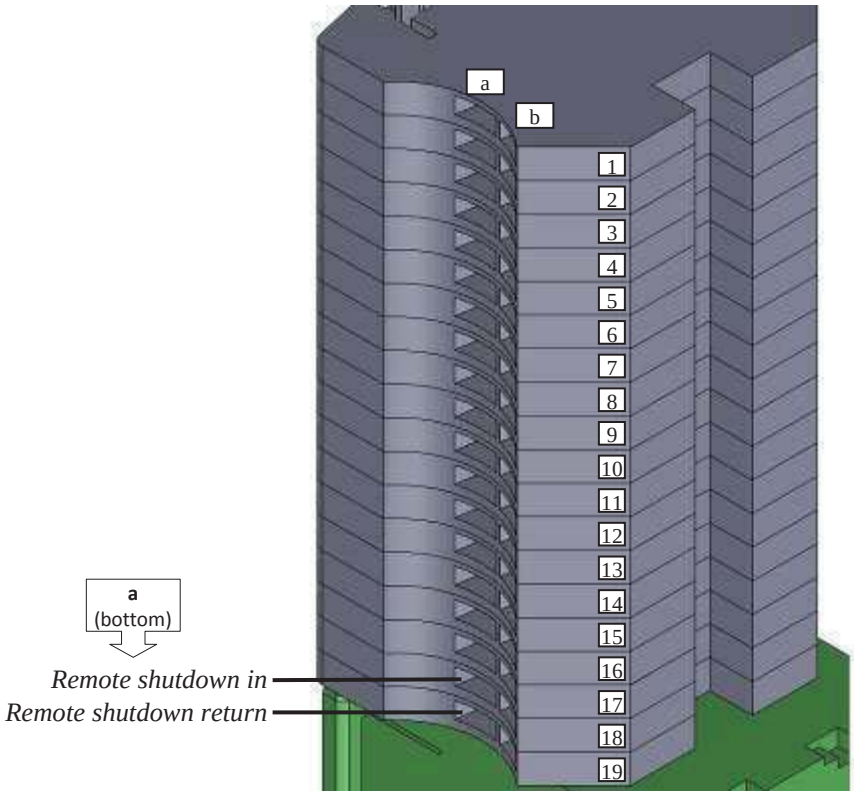


Figure 4.6 – Remote Shutdown Wiring Locations on Terminal Blocks 18 and 19

4.9 SolrenView Monitoring

SolrenView is a state of the art web based inverter monitoring system. The SGI series of inverters are equipped with SolrenView monitoring hardware as part of the display module. To activate the hardware, SolrenView monitoring services must be purchased from Solectria Renewables. An Ethernet cable is then connected to a router with broadband internet on the premises for IP address assignment.

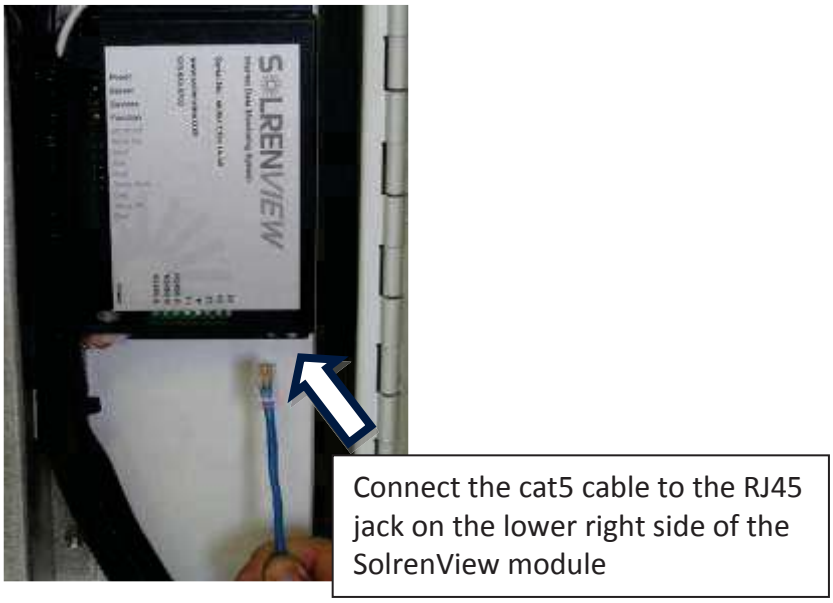


Figure 4.7 – Connection of Optional SolrenView Monitoring System

For multiple inverters at one location it is necessary to connect an Ethernet cable to each inverter then to a router or switch for connection to the customer's broadband internet service.

To enable the SolrenView monitoring follow these steps using the display panel.

1. Press ↵ to enter the display set mode
2. Press ↓ to MONITOR
3. Press ↵ to enter monitor set mode
4. Press ↓ to SRV Mode
5. Press ↵ to activate the change mode
6. Press ↓ to select Yes
7. Press ↵ to confirm

4.10 SolrenView Air Monitoring

If you have purchased the 3G cellular SolrenView Air monitoring option, all of the hardware will be installed in the inverter and configured at the factory. The inverter will begin to report to the SolrenView server as soon as the inverter is commissioned with AC and DC power and a cellular signal is present. No additional installation or configuration steps are necessary.

5.0 Commissioning the Inverter PV System

At this point the inverter should be mounted, all connections are made and the inverter is ready for power to be applied.

NOTE: Make sure all tools, parts, etc. are removed from the vicinity of the inverter before turning on.

WARNING: Make a final check of all AC and DC wiring to the inverter and in the system before turning on.

NOTE: With the PV modules connected and inverter disconnects still off, perform a final check of the PV voltage and polarity once more using a digital volt meter and probing the positive (+) and negative (-) PV connections. Verify clockwise AC phase rotation for L1, L2, L3 using a phase rotation meter.

5.1 Turning on the Inverter

- Turn on the dedicated three-phase circuit breaker or disconnect at the building service.
- Turn on the inverter's DC disconnect using the handle on the front door.
- Turn on the inverter's three-phase AC breaker using the handle on the front door.
- Watch the LED indicators for initialization (green and red LEDs on), then a slow blinking green LED followed by a faster blinking green LED. Watch the LCD display for prompts and system status.
- Listen for contactor closing (inverter on-line).
- Listen for slight 60 Hz hum (transformer on-line).
- Following the blinking green LED and high frequency switching sound you should see a solid green LED. This confirms that the inverter is operating normally. The LCD display will show the AC Power (PAC), Energy (EAC), current and voltage as well as DC voltage.

5.2 Operation

The control electronics will be active as soon as the DC voltage reaches 300VDC. The inverter will go on-line with the utility three-phase grid when the DC voltage first exceeds 390VDC (strike voltage). Next, the inverter will load the array, bringing the DC voltage down from 390VDC to not less than 300VDC, unless the low voltage option has been selected, in which case the strike voltage will be 370VDC and the minimum MPPT voltage will be 285VDC.

Once there is enough PV power to back feed three-phase AC power, power switching will automatically feed power to the grid.

5.3 Turning off the Inverter

- If possible, use the keypad to temporarily disable the power output.
- Turn off the inverter's DC disconnect using the handle on the front door.
- Turn off the inverter's three-phase AC breaker using the handle on the front door.
- Wait at least one minute for the capacitor bank to discharge.

6.0 LCD Display and LED Indicators

The inverter operates automatically without the need for user interaction. The LCD display and Led indicators on the front door of the inverter provide valuable inverter operating information.

6.1 LCD Display

Figure 6.1 – LCD Display

6.2 Button Description

To move up a level from the current menu

To scroll up or down within the individual menu items

To enter into selected menu

6.3 Screen Descriptions

Main Screen (Default)

Eac: XXXX kWh
Pac: XX W

Press ↵ or ↓ or ↑ to move from the main / default screen into the Start Menu. To enter into a selected menu item, press the ↵ key.

Start Menu

1. Measurements
2. Set Inverter
3. Inverter Events
4. Monitor
5. RG Meter (if installed)
6. Info

Measurements Menu

This displays the data retrieved from the inverter. Use the ↓ ↑ buttons to scroll up and down through the list. Pressing ESC will take the screen back to the start menu.

AC Energy	*Cumulative AC Energy (kWh)*
AC Power	*AC Power output (W)*
AC Voltage	*AC Voltage, Three-phase (V)*
AC Freq.	*AC Frequency (Hz)*
AC Current (average)	*AC Current, Three-phase average (A)*
DC Voltage	*DC Voltage (V)*
Apparent Power	*Apparent AC Power output (VA)*
Reactive Power	*Reactive AC Power output (VAr)*
Reactive Avail.	*Available Reactive AC Power output (Var)*
React. Energy (+)	*Cumulative reactive energy generated (kVArh)*
React. Energy (-)	*Cumulative reactive energy received (kVArh)*
Heat Sink	*Heat Sink Temperatures (°C) #1-3*
DC Current #1-2	*DC Current(A) #1- 2 (Only available with SolZone)*
DC Current #3-4	*DC Current(A) #3-4 (Only available with SolZone)*
DC Current #5-6	*DC Current(A) #5-6 (Only available with SolZone)*
DC Current #7-8	*DC Current(A) #7-8 (Only available with SolZone)*

Note: data will only be available when inverter is awake and communicating.

Set Inverter Menu

This displays inverter parameters, some of which may be modified with the keypad. Use the buttons to scroll up and down through the list. Pressing will take the screen back to the start menu.

1. Power Disable — *Temporarily disables the AC output of the inverter*
2. Inverter ID — *Serial port address/ID of the inverter*
3. Baud Rate — *Serial port baud rate (19200 or 9600)*
4. Vac Very High — *AC Voltage Critical High*
5. Vac High — *AC Voltage High*
6. Vac Low — *AC Voltage Low*
7. Vac Very Low — *AC Voltage Critical Low*
8. Fac Low — *AC Frequency Low*
9. Fac Very Low — *AC Frequency Critical Low*
10. Fac High — *AC Frequency High (Not adjustable)*
11. Power Level — *Inverter AC power output level*
12. VAC — *Inverter VAC*
13. Transformer — *Transformer model*
14. Limit Power — *Limit AC Power (%)*
15. UL Reconnect — *Wait time in minutes/seconds*
16. Password — *4-digit pin code to set limits*

Note: data is only available when inverter is operating.

Inverter Events Menu

This displays inverter errors / event history. Timestamps are formatted as MM/DD/YY.

1. Err Counts — *Displays cumulative counters for each supported event / error, with the highest error count shown first.*
2. Err Log — *Displays events (change of state) with the earliest event shown first.*
3. Clear — *Clear History Options:*
   - Err Counts — *This clears the Err Counts menu.*
   - Err Log — *This clears Err Log menu.*
   - All — *This clears both error menus.*

List of Logged Events

- Fan Life Reached
- MOV Fault
- AC Volt High
- AC Volt Low
- AC Freq High
- DC GND FAULT
- Min Vmpp Reached
- AC Contact Open
- CT Failure
- AC Islanding
- Open Phase
- AC Freq Low
- NTC Failure
- IGBT Overtemp
- Desat Error
- Power Derated
- DC Volt High
- MAG Failure
- Vsense Err
- Contactor Fail
- PS Fail
- PS Wake Fail
- PS Fail (Slave)
- Lost Freq Lock
- VDC Ctrl. Fail
- DMGI Overtemp

Monitor Menu

Displays monitor settings that may be modified with the keypad.

1. LAN	*Local Area Network configuration, applicable only for SolrenView monitoring*
a. DHCP Mode	*See SolrenView manual on DHCP*
b. Static/Fallback IP	*If DHCP is turned on, this is then used as the fallback IP*
2. Gateway IP	*IP address of LAN's default gateway*
3. Netmask	*Subnet mask*
4. Date/Time	*Manual time set. This may be overwritten by scheduled NIST updates.*
5. Reboot	*Reboots the monitor*
6. Remote SRV	*This starts the transmit process necessary for SolrenView monitoring. Note: Enabling this option when SolrenView service has not been purchased will result in unnecessary wear on the storage memory.*
7. Reset SRV	*Settings are cleared to factory defaults. Caution: This will also clear Revenue-grade KYZ counters.*

6.4 LED Indicators

The LED indicators mounted on the front left of the inverter enclosure just above the LCD screen give the installer and user a quick look at what state the inverter is in and if it is operating normally.

GREEN – POWER, the unit is powered up and / or feeding power to the grid

RED – ERROR or FAULT, the inverter is not providing power due to an error or fault

YELLOW – indicates that a ground fault in the PV array has been detected and it must be located and repaired before the inverter will function. Check GFDI breaker if YELLOW LED remains solid.

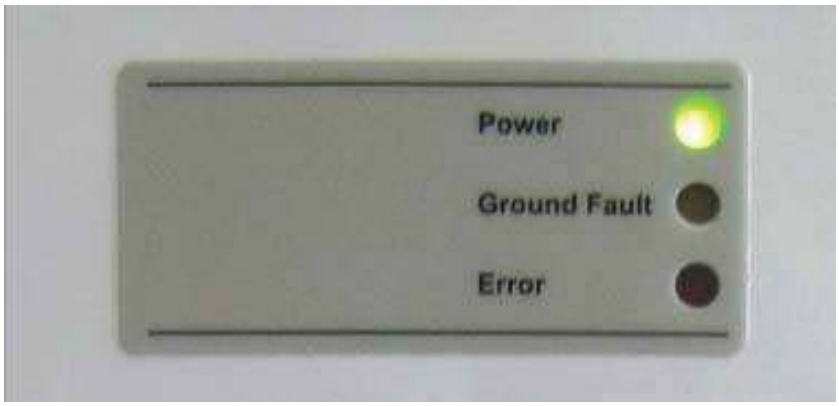


Figure 6.2 – LED Indicators

GREEN	○	A ground fault has been detected in the PV array	DO NOT TOUCH any equipment (including, but not limited to: the inverter, the PV array disconnects, the PV array combiners, the PV panels, the PV racking system). Immediately contact the installer or another qualified person to locate and repair the source of the ground fault.
YELLOW	●		
RED	○		

For other LED indications please contact Solectria Renewables Customer Support.

7.0 Troubleshooting and Inverter Messages

Although the inverter is designed for many years of power production there may be instances where messages may be displayed on the LCD screen. For ease of diagnostics most messages are displayed as an error message.

7.1 Inverter Messages

Pac: XXXX W Power Derating	The inverter is in derating mode. Can be caused by high input power, high temperature, AC line impedance.	Check string sizing, ambient temp, fans operating, vents are clear, AC wire sizing
Pac: XXXX W MOV Fault	A high voltage transient has occurred from the AC grid voltage. Usually from lightning.	The inverter will need to be inspected and serviced by an authorized service provider.
Pac: XXXX W AC Voltage High	The AC grid voltage is exceeding the high limit.	Measure the actual VAC compared to the LCD display VAC. If VAC is greater than acceptable limits inverter will restart when normal.
Pac: XXXX W AC Voltage Low	The AC grid voltage is less than the low limit.	Measure the actual VAC compared to the LCD display VAC. If VAC is less than acceptable limits inverter will restart when normal.
Pac: XXXX W AC Freq High	The AC grid frequency is exceeding the high limit.	If possible measure the frequency or contact local utility provider.
Pac: XXXX W AC Freq Low	The AC grid voltage is less than the low limit.	If possible measure the frequency or contact local utility provider.
Contactor Fail 978-683-9700	The AC contactor or sensing circuit has failed	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
CT Failure 978-683-9700	An internal failure has occurred in one or more of the cores	Turn the DC and AC off, restart the inverter. The inverter may need to be inspected and serviced by an authorized service provider.
Thermal disc. 978-683-9700	The AC contactor is open when it is being commanded to be closed	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
NTC Failure 978-683-9700	The internal temperature sensor has failed.	Turn the DC and AC off, restart the inverter. The inverter may need to be inspected and serviced by an authorized service provider.
IGBT Overtemp 978-683-9700	The internal temperature is exceeding operational limits	Turn the DC and AC off, let the inverter cool to ambient temperature and restart the inverter.
Desat Error 978-683-9700	Internal component sensing fault	Turn the DC and AC off, restart the inverter. The inverter may need to be inspected and serviced by an authorized service provider.

DC GND Fault Check DC Wiring	A ground fault has been detected in the PV array	DO NOT TOUCH any equipment (including, but not limited to: the inverter, the PV array disconnects, the PV array combiners, the PV panels, the PV racking system). Immediately contact the installer or another qualified person to locate and repair the source of the ground fault.
VAC Low Reconnecting	The inverter had a "UL event" and is in the 5 minute wait period	Wait for the inverter to restart
Pac: XXXX W Waiting for grid	Grid voltage may not be present	Check for grid voltage
Reverse phasing & restart PVI!	The VAC grid connection phasing does not match the inverter	Change the phase wire positions at the inverter connection on the grid side
Pac: XXXX W Min Vmpp reached	The power point tracking has been reached	The inverter will hold the Vmpp at this level until it increases.
AC Contact Open 978-683-9700	The AC contactor is open when it is being commanded to be closed	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Vsense Err 978-683-9700	An internal failure of the voltage sensing circuit has occurred	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Open Phase 978-683-9700	One of the AC phases is not present at the inverter	Verify that there is AC voltage on all phases at the inverter and all fuses are intact.
MAG Failure 978-683-9700	An internal failure of one of the magnetic components	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Pac: XXXX W PS Fail	An internal failure of the master power stage	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Pac: XXXX W PS Fail (Slave)	An internal failure of one of the slave power stages	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Pac: XXXX W PS Wake Fail	One of the internal power stages did not initialize properly	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Pac: XXXX W Lost Freq Lock	An internal failure of the voltage sensing circuit	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Pac: XXXX W VDC Ctrl Fail	The DC voltage is outside of the regulation specifications	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.
Pac: XXXX W DMGI Overtemp	One of the internal power stages has exceeded its temperature limit	Turn off the inverter and contact Solectria Renewables. The inverter may need to be serviced by an authorized service provider.

8.0 Product Warranty & RMA Policy

8.1 Warranty Policy

The Solectria Renewables Warranty Policy is stated below.

Solectria Renewables Warranty Coverage:
Solectria Renewables Limited Warranties are provided by Solectria Renewables, LLC. ("Solectria Renewables") and cover defects in workmanship and materials. Solectria Renewables' price for the products is based on inclusion of these limited warranty provisions and disclaimers. In the event of a conflict between the terms of this Limited Warranty and any terms and conditions proposed by purchasers of Solectria Renewables' products, these Limited Warranty provisions shall govern the parties' obligations with respect to warranty coverage for defective products.

Duration of a Solectria Renewables Warranty Period:
For three-phase inverters (PVI 10kW and higher) and for the PVI 1800 and PVI 2500 inverters, the warranty period is 60 months from the date of purchase of the inverter by the end user or 64 months after the delivery date from Solectria Renewables to the distributor or the dealer / installer, whichever is shorter. If a warranty extension has been purchased, the term is defined as an extension beyond 60 months. For example, if a 5 year extension (to 10 years total) is purchased, the term becomes 120 months from date of purchase. For the PVI 3000 to PVI 7500 inverters, the warranty period is 120 months from the date of purchase by the end user or 124 months after the delivery date from Solectria Renewables to the distributor or the dealer / installer, whichever is shorter.

If Solectria Renewables repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the repair/replacement shipment to the customer, whichever is greater.

Solectria Renewables' obligation to repair or replace a defective product under this warranty is contingent upon Solectria Renewables receiving full and timely payment for the warranted products and associated shipping charges. Solectria Renewables Warranty Coverage is voidable, at Solectria Renewables' sole option, if full payment for products and associated shipping charges are not received in full and in a timely manner by Solectria Renewables. Please contact Solectria Renewables Customer Service for further details on other products.

What will Solectria Renewables do?
Solectria Renewables will, at its sole option, repair or replace the defective product free of charge, provided that Solectria Renewables is notified of the product defect within the Warranty Period for the product, and provided that Solectria Renewables, through inspection, establishes the existence of such a defect and that it is covered by the Limited Warranty.
Solectria Renewables will, at its sole option, use new and / or reconditioned parts in performing warranty repair and /or replacements. Solectria Renewables reserves the right to use parts or

products of original or improved design in the repair or replacement of the product. All replaced products and all parts removed from repaired products become the property of Solectria Renewables. Solectria Renewables will attempt to repair the unit within a reasonable time period. No provision will be made for reimbursement of lost energy production.

For three-phase inverters 10kW and higher:
Solectria Renewables covers parts, travel and labor necessary to repair the product and shipment of parts to and from the customer via a Solectria Renewables-selected non-expedited surface freight within the contiguous United States, Canada and Mexico. For Alaska, Hawaii and all other installation locations Solectria Renewables will supply necessary parts as needed for warranty repairs; however, travel is not included. Contact Solectria Renewables Customer Service for details on the freight policy for return shipments outside of the contiguous United States, Canada and Mexico.

For single-phase inverters 7.5kW and lower:
Solectria Renewables covers replacement inverters or parts necessary to repair the product and shipments of parts to and from the customer via a Solectria Renewables-selected non-expedited surface freight within the contiguous United States, Canada and Mexico. For Alaska, Hawaii and all other installation locations Solectria Renewables will cover the cost of return shipment of product one way from the customer. The warranty does not include customs fees, broker fees or other taxes that may be imposed by the government agency. Contact Solectria Renewables customer service for details on the freight policy for return shipments outside of the contiguous United States, Canada and Mexico.

Obtaining Service:
If your product requires troubleshooting or warranty service, contact your distributor or dealer / installer. If you are unable to contact your distributor or dealer / installer, or the distributor or dealer / installer is unable to provide service, contact Solectria Renewables directly at the number listed on the website in the customer service section for your product.

Solectria Renewables may send personnel to a jobsite or contract with an area technician, installer or other authorized, trained service personnel to service / replace components.

Reimbursement for contracted services: Solectria Renewables will submit a purchase order to the designated service personnel before work is performed. This purchase order will cover time expected for the required service and most likely an allocation for travel time.

Direct returns may be performed according to the Solectria Renewables Return Material Authorization Policy.

In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Solectria Renewables.

Proof of purchase may be in any one of the following forms:
- The dated purchase receipt from the original purchase of the product at point of sale to the end user, or
- The dated distributor or dealer / installer invoice or purchase receipt showing original equipment manufacturer (OEM) status, or
- The dated invoice or purchase receipt showing the product exchanged under warranty.

Solectria Renewables provides technical assistance Monday-Friday, 8:30am-7pm EST and on-call technical support is provided outside normal business hours.

What does the Solectria Renewables warranty not cover?
Solectria Renewables Limited Warranties do not cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. These warranties do not apply to and Solectria Renewables will not be responsible for any defect in or damage to:

a) The product, if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;

b) The product, if it has been subjected to fire, water, generalized corrosion, biological infestations, acts of God or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Solectria Renewables product specifications including high input voltage from generators or lightning strikes;

c) The product, if repairs have been made to it other than by Solectria Renewables or its authorized, trained service personnel;

d) The product, if it is used as a component part of a product expressly warranted by another manufacturer;

e) The product, if its original identification (trademark, serial number) markings have been defaced, altered, or removed;

f) The product, if it has been damaged in shipping (unless approved in writing by Solectria Renewables);

g) Any installation and operation beyond the scope covered by relevant safety regulations (UL1741, NFPA 70, etc.);

h) Third party monitoring equipment;

i) Failure to perform Preventative Maintenance may void the warranty.

DISCLAIMER

SOLECTRIA RENEWABLES LIMITED WARRANTIES ARE THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY SOLECTRIA RENEWABLES IN CONNECTION WITH YOUR SOLECTRIA RENEWABLES PRODUCT AND ARE, WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR CONDITION OR QUALITY OF THE PRODUCT, ANY IMPLIED WARRRANTY OF FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY OF DISTRIBUTOR OR DEALER/INSTALLER ABILITY, ALL OF WHICH ARE EXPRESSLY DISCLAIMED TO THE FULLEST EXTENT PERMITED BY LAW.

ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY OF DISTRIBUTOR OR DEALER / INSTALLER ABILITY, TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT, SHALL BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY, TO THE FULLEST EXTENT PERMITTED BY LAW.

IN NO EVENT WILL SOLECTRIA RENEWABLES, INCLUDING ITS SUPPLIERS, MANUFACTURERS, VENDORS, SUBCONTRACTORS, DISTRIBUTORS, DEALERS AND ANY OTHER AFFILIATES BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, COSTS OR EXPENSES HOWEVER ARISING WHETHER IN CONTRACT OR TORT INCLUDING WITHOUT RESTRICTION ANY ECONOMIC LOSSES OF ANY KIND, ANY LOSS OR DAMAGE TO PROPERTY, INCLUDING LOSS OF USE AND INTANGIBLE HARM OF ANY KIND, AND ANY PHYSICAL DAMAGE OR OTHER DAMAGE ARISING FROM OR AS A RESULT OF ANY USE, MISUSE OR ABUSE OF THE PRODUCT, OR THE INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT, REGARDLESS OF WHETHER SUCH INSTALLATION, INTEGRATION OR OPERATION WAS PERFORMED PROPERLY OR IMPROPERLY.

Solectria Renewables neither assumes nor authorizes any other person to assume for it any other liability in connection with the repair or replacement of the Product.

Exclusions of the Policy: Installation and Operation Manual

If your product is a consumer product, the applicable law may not permit exclusion of implied warranties. To the extent permitted by the applicable law such warranties are limited to the duration of this Limited Warranty. Some jurisdictions do not allow any limitations on the duration of an implied warranty, or exclusions on implied warranties, or on the limitation or exclusion of incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to you. This Limited Warranty gives you specific legal rights. You may have other rights, which may vary from state to state or province to province.

WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, UNLESS SPECIFICALLY AGREED TO BY IT IN WRITING, SOLECTRIA RENEWABLES

(a) MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN MANUALS OR OTHER DOCUMENTATION PROVIDED BY IT IN CONNECTION WITH THE PRODUCT; AND

(b) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSSES, DAMAGES, COSTS OR EXPENSES, WHETHER SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION.

THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USERS' RISK.

WARNING: LIMITATIONS ON USE

Please refer to your product user manual for limitations on uses of the product. Specifically, please note that Solectria Renewables' products are not intended for use in connection with life support systems and Solectria Renewables makes no warranty or representation in connection with any use of the product for such purposes.

8.2 Return Material Authorization Policy

Please review our Return Merchandise Authorization Policy below.

Obtaining a required, Return Material Authorization:
Before returning a product directly to Solectria Renewables you must obtain a Return Material Authorization (RMA) number and the correct factory "Ship To" address. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without an RMA number clearly marked on the outside of the shipping box, if they are shipped collect, or if they are shipped to the wrong location.

Information Solectria Renewables needs when you are obtaining service:
1) The model names and serial number of your product

Preparing the product for shipping:

1) Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.

2) Include the following:
   a. The RMA number supplied by Solectria Renewables clearly marked on the outside of the box.

   b. A return address to which the unit can be shipped. Post office boxes are not acceptable.

   c. A contact telephone number where you can be reached during work hours.

   d. A brief description of the problem.

Ship the unit prepaid to the address provided by your Solectria Renewables' customer service representative.

Returning a product from outside of the USA or Canada:
In addition to the above, you MUST include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.

9.0 Technical Data

Input (DC) from PV array:

- Maximum open circuit voltage of PV array is 600V DC

WARNING: NEC 690-7 must be followed to calculate the maximum number of PV modules allowed for a maximum inverter open circuit voltage (OCV) of 600V DC in extreme cold temperatures for the installation location.

The open circuit voltage of PV modules depends on the cell temperature and the solar irradiation. The highest open circuit voltage occurs when the PV modules are at the coldest temperature and in bright sun.

Because the PV modules also have a reduction in voltage at high cell temperatures, you must make sure the MPPT voltage of the strings will not drop below the minimum inverter DC input voltage in very hot temperature conditions.

Both the maximum open circuit voltage (OCV) when at cold extreme and minimum MPPT voltage when at hot extreme can be calculated for a PV module using its specification sheet. PV module string sizing can then be used to determine how many modules can be used in a string. Visit www.solren.com/stringsizing.html to use Solectria's interactive string sizing tool.

9.1 Input DC (PV) Specifications

	SGI 225	SGI 250	SGI 266	SGI 300	SGI 500	Unit
Standard Units						
Operating voltage range	300-600					VDC
Input voltage MPPT range	300-500					VDC
Strike Voltage	390					VDC
Maximum input current	768	853	908	1026	1721	ADC
Continuous input current	768	853	908	1026	1721	ADC
Low DC Voltage Option Units						
Operating voltage range (low voltage option)	285-600					VDC
Input voltage MPPT range (low voltage option)	285-500					VDC
Strike Voltage (low voltage option)	370					VDC
Maximum input current (low voltage option)	808	898	956	1080	1812	ADC
Continuous input current (low voltage option)	808	898	956	1080	1812	ADC
All Units						
DC voltage measurement accuracy	+/- 2%					
Max continuous input power	230.5	256	272.5	308	516.5	kW
Maximum open circuit voltage	600					VDC
Absolute Maximum open circuit voltage	625					VDC
DC current measurement accuracy (SolZone option only)	+/- 2%					
DC Ground Fault Trip Setting	4		5			ADC

Table 9.1 – DC Input Specifications

9.2 Output AC Specifications

The inverters are designed to feed power into a standard 60Hz, three-phase AC utility service provided within a facility by a transformer with a rating of not less than the rating of the inverter(s) connected to it.

As required by NEC, there must be a dedicated three-phase circuit breaker for the PV inverter connection.

The inverter is designed to work with the range of AC voltages for a three-phase service defined by IEEE 1547-2003 and ANSI C84.1.

	SGI 225	SGI 250	SGI 266	SGI 300	SGI 500	Unit
Operating AC voltage range	88 – 110%					VAC
Turn-on AC voltage range	92% – 105%					VAC
Default over/under voltage trip points and times	per IEEE Std 1547-2003, Table 1 or utility specific order codes					
Over voltage trip magnitude adjustability	100% - 120%					V_{nom}
Under voltage trip magnitude adjustability	50% - 100%					V_{nom}
Over / under voltage trip time adjustability	0.1 – 30					sec
Voltage measurement accuracy	+/- 2 %					
Operating frequency adjustability	(60) -3.0 - +0.5					Hz
Under frequency trip time adjustability	0.16 – 300					sec
Frequency measurement accuracy	+/- 0.1					Hz
Maximum Rated Output Current (208VAC) external transformer	624	693	738	832	1388	Arms
Maximum Rated Output Current (208VAC) internal transformer	624	693	738	N/A	N/A	Arms
Maximum Rated Output Current (480VAC)	271	301	320	360	602	Arms
Maximum Rated Output Current (600VAC)	217	240	256	289	480	Arms
Short Circuit Current Contribution						
Utility Short Circuit Current Output (480VAC) *duration of 10 line cycles*	271	301	320	360	602	Arms
Peak Short Circuit Current Output (480VAC) *duration of less than 300 microseconds*	27	36	36	36	60	kA_{pk}
AC current measurement accuracy	+ / - 3%					
AC real power and energy measurement accuracy	+ / - 5%					
Total Harmonic distortion (THD, @ full power)	< 3%					
Power Factor	Unity, >0.99					
Anti-islanding protection	per UL1741 / IEEE1547 / CSA22.2#107.1					
Peak Efficiency	97.99%	97.98%	97.96%	97.90%	97.87%	
CEC Weighted Efficiency	97.5%	97.5%	97.5%	97.5%	97.0%	

Table 9.2 – AC Output Specifications

9.3 Other Specifications

DC Ground Fault Protection	Per UL 1741
DC Ground Fault Current Withstand	Certified in UL 1741 testing to 3.2kADC, components rated to 25kADC
DC Fuse Subcombiner Range	70A-400A fuses available, 6-32 poles
DC Breaker Subcombiner Range	110-400A breakers available, 6-16 poles
DC Disconnect (Integral)	Break load rated
Operational Ambient Temperature	-40° to 50°C (full power)
Storage Temperature	-40° to 70°C
Cooling	Automatic Forced Convection
Inverter Enclosure	Rain Proof per UL1741, NEMA 3R
Switching Electronics Enclosure	IP-62 (sealed design)
Sound Pressure Level (A-Weighting)	< 68dBA at 1m < 60dBA at 5m < 57dBA at 10m

Table 9.3 – Other Specifications

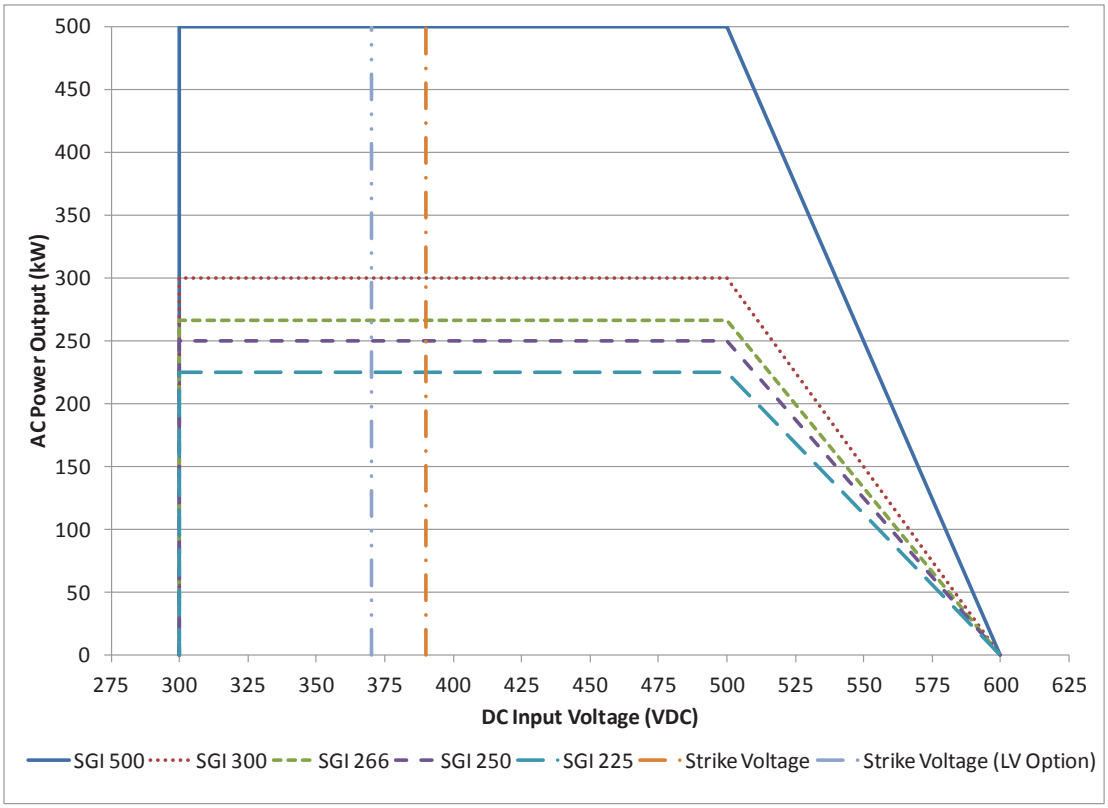


Figure 9.1 – AC Output Power of SGI Series Inverters

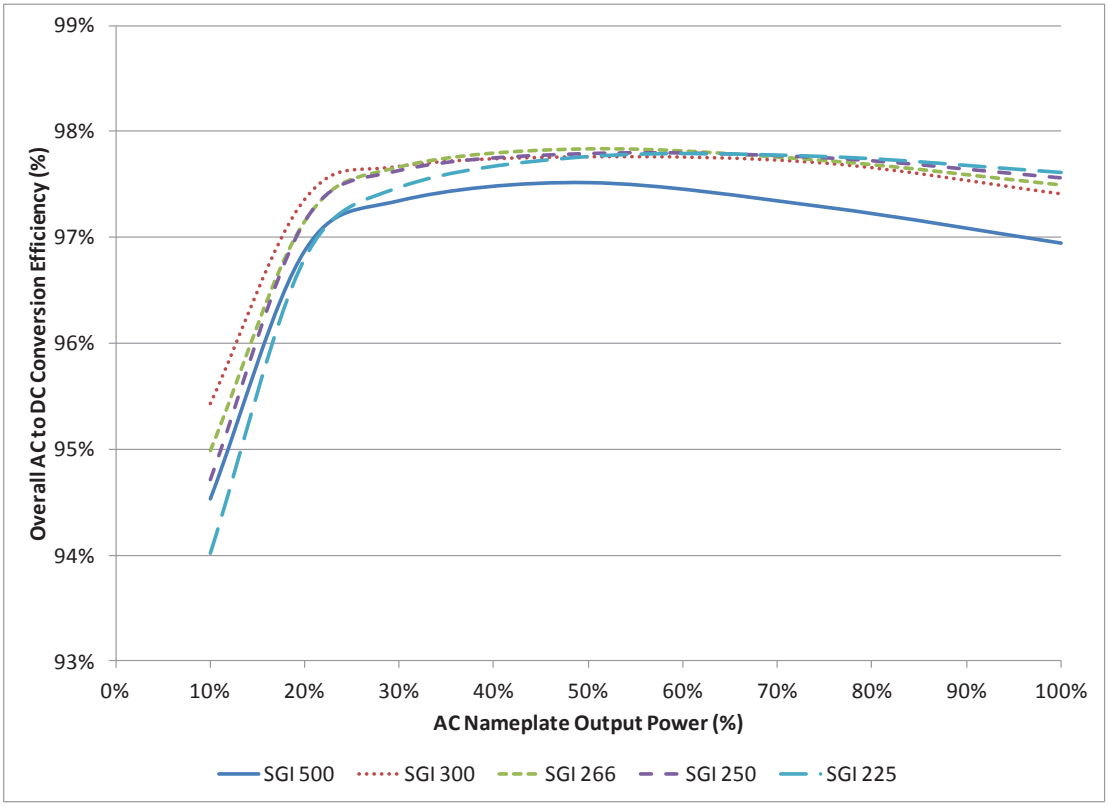


Figure 9.2 – Efficiency of SGI Series Inverters at 360VDC Input and 25C Ambient Temperature

9.4 Internal Circuit Diagram

The basic power flow within the SGI series of inverters is shown in the simplified one-line diagrams below. Note that the GFDI circuit is not depicted.

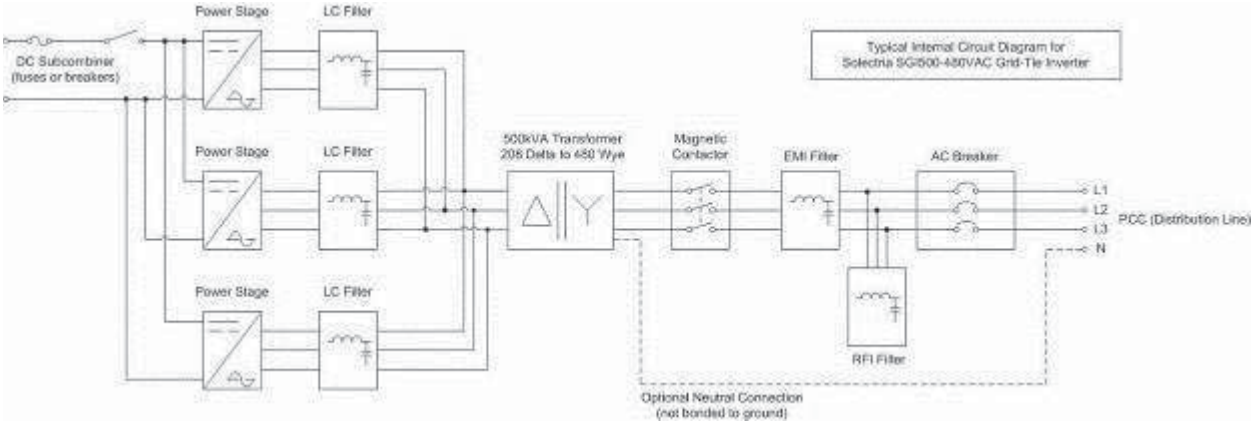


Figure 9.3 – Simplified Internal Circuit Diagram for SGI 500-480VAC

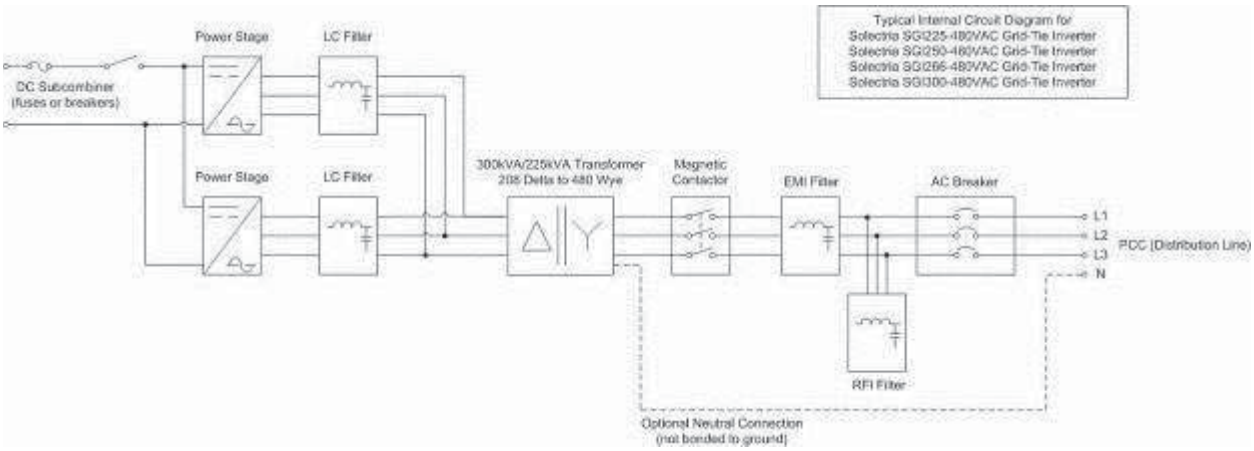


Figure 9.4 – Simplified Internal Circuit Diagram for SGI 225-480VAC through SGI 300-480VAC

10.0 Appendices

10.1 Appendix A – SGI 225, SGI 250, SGI 266, SGI 300 and SGI 500 Data Sheet

http://www.solren.com/utility.html

10.2 Appendix B – String Sizing Tool

http://www.solren.com/stringSizing.html

10.3 Appendix C – Contact Information

Solectria Renewables LLC
360 Merrimack Street
Building 9, 2nd floor
Lawrence, Massachusetts 01843
USA

Tel:	978.683.9700
Fax:	978.683.9702
Sales/ general info:	inverters@solren.com
Customer Support:	service@solren.com
Website:	www.solren.com

10.4 Appendix D – Authorized Distributors

See website for complete and updated listing: www.solren.com

10.5 Appendix E – UL1741 / IEEE 1547 / CSA22.2#107.1 Listing Letter

Intertek

3933 US Route 11
Cortland, NY 13045

Telephone: (607) 753-6711
Facsimile: (607) 756-9891
www.intertek-etisemko.com

June 30, 2010

Letter Report No. G100042079CRT-001b
Project No. G100042079

Michael Zuercher-Martinson

Ph: (978) 683-9700

Solectria Renewables, LLC
360 Merrimack St.
Building 9, Floor 2
Lawrence, MA 01950

Email: michael@solren.com

Subject: ETL Listing Evaluation of Grid-tied Photovoltaic Inverter

Dear Mr. Michael Zuercher-Martinson,

This letter confirms that Intertek has completed the Safety evaluation of your SGI 500, SGI 300, SGI 266, SGI 250 and SGI 225 Grid-tied Photovoltaic Inverter, and have listed them to the following standard:

UL 1741, Safety for Inverters, Converters, Controllers and interconnection System Equipment for Use With Distributed Energy Resources, First Edition, May 7, 1999 with revisions through January 28, 2010

CAN/CSA C22.2 No. 107.1: 2001/09/01 Ed: 3 (R2006)

This evaluation was authorized by signed quotation Q100042079, dated January 31, 2010.

If there are any questions regarding the results contained in this report, or any of the other services offered by Intertek, please do not hesitate to contact the undersigned.

Completed by:	Haiwen Liu	Reviewed by:	Steven Pasternack
Title:	Staff Engineer	Title:	Sr. Staff Engineer
Signature:		Signature	
Date	June 30, 2010	Date:	June 30, 2010

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